Forest Health Technology Enterprise Team

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Identification of Moths

Macromoths of Northwest Forests and Woodlands

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FHTET-98-18
June 2000

U.S. Department of Agriculture Forest Service

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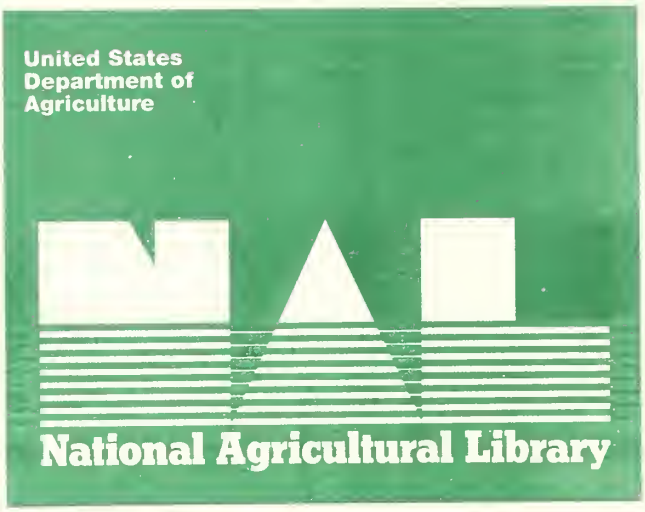

Cover Photographs: Top, ***Habrosyne scripta***, photo #247 (Thyatiridae)
Center, ***Chlorosea banksaria***, photo #76 (Geometridae)
Bottom, ***Behrensia conchiformis***, photo #171 (Noctuidae)

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ACKNOWLEDGMENTS

The following individuals have provided their expertise in identifying Lepidoptera reared from field-collected caterpillars and collected as adults during parts of our ongoing research projects regarding moths of the Northwest: Doug Ferguson, Don Lafontaine, Paul Opler, Jon Shepard, Jim Troubridge, and Lars Crabo. The following individuals have helped collect moths and rear caterpillars: Gary Parsons, Dana Ross, Pete Oboyski, Mike LaMana, Carolyn ver Linden, Joshua Miller, Jacob Miller, Kimberly Miller, Jean Miller, Norm Anderson, Jack Lattin, Maret Pajute, and Rich Bowden. The photographs were taken by Jeff Miller. The authors, Dana Ross, and Bill Heyborne spread most of the moths used for the photographs. A majority of the specimens reside in the macromoth collection of Jeff Miller with the remainder located in the insect collection at Oregon State University.

We built our knowledge about the macromoths of the Pacific Northwest from the legacy of past collectors. The most notable contributors to information about species lists, distributions, and flight periods were Stanley G. Jewett, Jr., C. William Nelson, James H. Baker, Elmer L. Griepentrog, Victor B. McHenry, Kenneth J. Goeden, and Ernst Dornfeld. The extensive collecting efforts by these individuals created a foundation for our work. In particular, Jack D. Lattin, in his role as a Professor of Entomology and Director of the Systematic Entomology Laboratory at Oregon State University, provided continuous encouragement and support for our studies over the last decade and a half.

Over many years and many projects partial funding for the various research studies in the forests of the Northwest has been provided to us by Oregon State University, Oregon Department of Agriculture, Willamette Institute for Biological Control, USDA Forest Service, U.S. Geological Survey (USGS), and the National Science Foundation (NSF) program for Long Term Ecological Research (LTER) DEB-80-12122 and DEB-96-32921.

The preparation of this manuscript was completed with help from Gary Parsons and Dana Ross. Individuals with USDA Forest Service, Northeastern Area State and Private Forestry, Newtown Square, PA, deserve special thanks: Roberta Burzynski for her very helpful editing, and Wendy Harding for layout and graphic design. A very special thank you to Jean Miller for spending many hours on field trips and helping critique photographs. This book would not have been produced without the encouragement and support of Ruth Jacobs, USGS; Betsy Littlefield, Cooperative Forest Ecosystem Research (CFER) program; and Richard Reardon, USDA Forest Service.

This report was published by the USDA Forest Service's Forest Health Technology Enterprise Team, Morgantown, West Virginia, with support from the USGS Forest and Rangeland Ecosystem Science Center, Corvallis, Oregon, and the CFER program, Corvallis, Oregon.

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INTRODUCTION

The macromoths are a group of families within the order Lepidoptera. The macromoths in the woodlands and forests of the Pacific Northwest are represented by 1,200 species in 12 families: Arctiidae, Dioptidae, Drepanidae, Epiplemidae, Geometridae, Lasiocampidae, Lymantriidae, Noctuidae, Notodontidae, Saturniidae, Sphingidae, and Thyatiridae. In addition to the macromoths, the Lepidoptera are represented by the butterflies and skippers, and the micromoths. Butterflies possess a knob at the tip of the antennae while the tip of the antennae in skippers is typically hooked. The tip of the antennae in macromoths and micromoths is tapered. The differences between macromoths and micromoths is not literally based on size as the names suggest but rather in details of the female reproductive tract and wing venation. These details are discussed and illustrated in most texts on general entomology (Borror et al. 1989) and in books about Lepidoptera (Covell 1984).

The Pacific Northwest, as considered here, consists of California north of San Francisco, Oregon, Washington, southern British Columbia, Idaho, and western Montana. In the context of the flora and fauna of western North America, the Pacific Northwest contains or is contiguous with four major biogeographic regions, namely, California, the Great Basin, the Rocky Mountains, and the Pacific Northwest. The Northwest region contains numerous mountain ranges, high desert, the Columbia River Basin, part of the Snake River, the Puget and the Willamette Valleys, and the northern Pacific coast.

The vegetation in the Pacific Northwest is very diverse and includes a flora adapted to coastal, desert, and alpine environments. The prevalent forest trees are species of conifers with Douglas-fir, ponderosa pine, lodgepole pine, and redwoods representing major forest types. Other conifers include spruce, hemlock, larch, true fir, cedar and numerous species of pine. The prevalent woodland trees include oak, alder, poplar and aspen, maple, and juniper. The understory vegetation in these forests and woodlands is also very rich in species. For example, some of the most prevalent species of flowering trees and shrubs occur in the genera: *Acer*, *Alnus*, *Amelanchier*, *Arbutus*, *Arctostaphylos*, *Artemisia*, *Baccharis*, *Chrysolepis*, *Ceanothus*, *Celtis*, *Cercocarpus*, *Cornus*, *Corylus*, *Crataegus*, *Fraxinus*, *Gaultheria*, *Holodiscus*, *Juniperus*, *Lithocarpus*, *Myrica*, *Oemleria*, *Pachistima*, *Philadelphus*, *Physocarpus*, *Prunus*, *Populus*, *Purshia*, *Quercus*, *Rhamnus*, *Rhododendron*, *Ribes*, *Rubus*, *Salix*, *Sambucus*, *Sorbus*, *Spiraea*, *Symphoricarpos*, *Umbellularia*, *Vaccinium*.

Approximately 180-200 species of butterflies and skippers and 400-500 species of micromoths are listed in the Pacific Northwest. However, the scientific effort that goes into understanding the Lepidoptera fauna is not evenly distributed, thus the low numbers of micromoths. The presence and identity of butterfly and skipper species in the Pacific Northwest is very well known, but the presence and identity of macromoths has been the subject of less attention, while the presence and identity of the micromoths is relatively little studied. The macromoth fauna of the Northwest has never been the subject of a comprehensive study and many species remain to be discovered and described. For instance, ***Mesogona rubra* (159)**, ***Oncocnemis greyi* (169)**, and ***Cerastis enigmatica* (205)** are recently described species discovered and named within the last few years. When more studies are conducted we expect the butterfly species count will remain nearly the same, but the macromoth species count could increase another 25 percent, to around 1,500 species, and the micromoth species count is likely to equal or exceed the number of macromoths.

The literature related to the identification of these moths principally exists in technical scientific journals, if at all. Macromoth identification is facilitated by books such as *A Field Guide to the Moths of Eastern North America* (Covell 1984) and a series of publications under the title *Moths of North America,* published by the Wedge Foundation. However, no general guide to the macromoths of western North America exists.

Identifying field-collected macromoths, either adults or caterpillars, to the species level is essential to performing natural history observations, accurately labelling collections, and conducting detailed ecological studies on host plants, parasitoids, and using Lepidoptera as indicator species in assessing environmental impacts. This guide to identification of the adults of macromoths of forests and woodlands with an emphasis on the fauna of the Pacific Northwest serves to complement a field guide to the caterpillars of Pacific Northwest forests and woodlands (Miller 1995). We have selected 251 species for diagnostic narratives and photographs of adults. Also, we have included discussion on over 300 additional species in diagnosing similar species to those featured with photographs. The geographical range for these species as a whole covers not just the Pacific Northwest States but also west of the Rocky Mountains and from northern California to southern British Columbia.

Life Cycle of Lepidoptera

The typical life cycle of a macromoth follows a sequence involving four life stages: the adult, egg, caterpillar, and pupa. This type of life cycle is termed holometabolous because it consists of complete development, including metamorphosis during the pupal stage, where the immature goes through a major transformation into an adult.

ADULT

A moth is the sexually mature adult life stage and serves three main functions in the life cycle: mating, dispersal, and oviposition. Many moths feed on nectar or a liquid sugar source, which primarily serves as fuel for flight. Some species of macromoths do not have functional mouthparts and cannot feed, therefore they are relatively short-lived and in turn will exhibit a short flight period.

Dispersal and flight activity. Typically moths possess two pairs of wings, a pair of forewings and a pair of hindwings. The forewings are attached to the second thoracic segment, the mesothorax, while the hindwings are attached to the third thoracic segment, the metathorax. Moths capable of flight, which is the primary means for local and long distance movement, may beat their wings up to 60 or 70 times per second. However, not all moths have wings, and not all moths with wings can fly. Individuals that do not have wings, as well as those that have wings but are flightless, do not have flight muscles. Typically the female is subject to the loss of flight muscles, which is accompanied by a higher capacity for egg production. The male of the species has fully developed wings and is flight capable. Examples of species with wingless females are the lymantriids ***Orgyia antiqua*** **(24)** and ***Orgyia pseudotsugata*** **(25)**, and the geometrids ***Erannis tiliaria*** **(45)**, ***Operopthera bruceata*** **(101)**, and ***Operopthera danbyi*** **(102)**.

The period for flight may be characteristic for a species and must be assessed in two types of time periods, the daily rhythm and the seasonal pattern. The majority of macromoths are night-flying species while a minority of species fly during the day. Some of the day-flying macromoths exhibit highly contrasting colors on their wings as exemplified by many of the arctiids such as ***Gnophaela vermiculata*** **(1)**, ***Tyria jacobaeae*** **(3)**, ***Leptarctia californiae*** **(4)**, and ***Platyprepia virginalis*** **(10)**; the male of the lymantriid ***Orgyia antiqua*** **(24)**; the geometrids ***Rheumaptera subhastata*** **(93)** and ***Mesoleuca gratulata*** **(94)**; the noctuids ***Alypia langtoni*** **(135)** and ***Schinia walsinghami*** **(218)**; the saturniids ***Hemileuca eglanterina*** **(232)** and

***Saturnia mendocino* (233)**; and the sphingids ***Hemaris diffinis* (244)** and ***Proserpinus clarkiae* (245)**. The behavior of being either a night or day flying moth is characteristic to most species, however, a few of the night flying species, such as ***Hyles lineata* (246)**, may be seen on the wing during the day.

The time of season and the length of time for the flight period of a species may also exhibit a diagnostic pattern. Most species occur at certain times of the year and may be present for a period of three to six weeks. For instance, the arctiid ***Lophocampa argentata* (13)** will be in flight during the last few days of July and the first three weeks of August with a peak in flight around the end of the first week in August. Similarly, the males of the geometrids ***Operopthera bruceata* (101)** and ***Operopthera danbyi* (102)** are only in flight from the middle of November to the last week of December. On the other hand a few species may have individuals in flight throughout much of the year. For instance, the geometrids ***Orthonama centrostrigaria* (98)** and ***Sabulodes aegrotata* (72)** fly from the last week of January continously through the spring, summer, and fall until the last week in November.

Mating and oviposition. Typically mating occurs soon after emergence from the pupa. The search for a mate is facilitated by volatile chemicals called pheromones. These chemicals are usually emitted by a virgin female and act as a sex attractant. Males detect the pheromone molecules with their antennae and fly upwind to locate the source of the chemicals, the female. The act of mating may take many hours, however, once the mating pair separates the female may begin laying fertile eggs. Pheromones are often species specific and help to reproductively isolate closely related species that occur in the same area.

EGG

Females may lay eggs singly or in clusters, depending on the species. Some species, such as ***Orgyia antiqua* (24)**, will deposit eggs on the silk surrounding the pupal skin. Other species, such as ***Euxoa satis* (201)**, scatter eggs on the soil surface. Most species attach their eggs to the vegetation that will serve as the caterpillar host plant. For instance, ***Phyllodesma americana* (20)** will attach a single egg to the leaf of various flowering trees that will then serve as food for the caterpillar. Egg production in species of macromoths may range from a low number of less than 100 eggs per female to a high number exceeding 1,000 eggs per female.

CATERPILLAR

The caterpillar is the actively feeding immature stage of moths and butterflies and is perhaps less obvious at first glance but can be abundant on certain plants at certain times of the year. Within a given environment caterpillars can be found in a variety of habitats and microhabitats. In general, they may be aquatic or terrestrial. Caterpillars can be found in fruits, roots and stems as borers or miners, in foliage as miners, on the surfaee of foliage as skeletonizers or chewers, in galls, or in the nests of other insects, such as ants and bees. Only the larval stage of Lepidoptera is called a caterpillar. Caterpillars initially develop in the egg and then emerge through the eggshell that they sometimes eat. The caterpillar increases in size each time it sheds its skin, a process called molting. The individual caterpillar is termed an

instar between molts. Typically, a caterpillar passes through five instars as it eats and grows. In certain species a caterpillar that will become an adult female may develop through an additional instar and thus grow bigger than the male. Even into the last instar it is usually difficult to distinguish between the sexes.

Most caterpillars feed and develop as solitary individuals; however, the caterpillars of a few species aggregate, some of which construct nests. For instance, the caterpillars of ***Lophocampa argentata*** **(13)** aggregate on branches of Douglas-fir but do not construct nests. The caterpillars of ***Hyphantria cunea*** **(9)** and ***Malacosoma californicum*** **(21)** occur in large colonies living in silk nests spun across twigs and branches of trees.

Caterpillar growth rates are strongly influenced by temperature and nutritional quality of host plants. Growth rates are slow at cold temperatures and up to a certain point faster at warm temperatures. Dependence of caterpillar development upon the nutritional quality of vegetation is strongly influenced by the amount of protein (nitrogen), water content, and allelochemicals. Most plants contain between 1% and 7% nitrogen by weight. Also, growth is enhanced when water content of the food is at the higher end of the normal range. Allelochemicals are plant-derived chemicals that may stimulate or deter feeding by caterpillars. Some of the better known allelochemicals are terpenes, alkaloids, phenolics, and various proteins. These chemicals may also act as poisons to the caterpillar or in certain instances the caterpillar may store poisons and in turn become toxic to potential predators. Many of the poisonous caterpillars are aposematic, that is they are brightly colored, with the colors acting as a warning signal to would be predators. For instance, the brightly colored caterpillar of the cinnabar moth, ***Tyria jacobaeae*** **(3)**, is poisonous to most prospective predators due to the storage of plant derived alkaloids.

The caterpillar life stage of many of the common species found in forests and woodlands of the Pacific Northwest are presented in a similar format as this book in Miller (1995). Also, the caterpillars of many species found in forests and woodlands of the eastern United States are presented in Wagner et al. (1997).

PUPA

Metamorphosis, the process of changing from a caterpillar into an adult occurs within the pupa. In butterflies the pupa is called a chrysalis. In moths the pupa may be covered in silk, which is called a cocoon, or the pupa may be naked but perhaps encased in rolled foliage or in the soil. When a caterpillar has attained a critical size it will change its behavior from feeding to searching for or creating a site to pupate. The pupal stage may last for 2 to 3 weeks, as in ***Cosmia calami*** **(152)**, or for more than 1 year, as in ***Coloradia pandora*** **(231)**. In many species the pupa overwinters. Typically, overwintering pupae are in diapause, a state of development when the eventual emergence of the adult is in an arrested condition. The adult will not mature and emerge from the pupa at the appropriate time unless the pupa is first exposed to a period of cold.

Overwintering. A majority of the species of macromoths in the Pacific Northwest overwinter in the pupal stage or in the egg stage. However, some species of macromoths will overwinter in the adult stage such as the noctuid ***Xylena cineritia***

(154) and the geometrid ***Triphosa haesitata* (92)**. Only a few of the common species in the Pacific Northwest overwinter as a caterpillar. Some of these are the arctiids ***Gnophaela vermiculata* (1)**, ***Lophocampa argentata* (13)**, and ***Pyrrharctia isabella* (5)**; the geometrid ***Neoalcis californiaria* (34)**; and the dioptid ***Phryganidia californica* (17)**.

Natural Enemies. Lepidoptera have many natural enemies. Predators of many types devour Lepidoptera, often in great quantities. Some of the most important predators are rodents; reptiles; bats; birds; spiders; nematodes; and other insects like beetles, true bugs, and parasitoids. Also, many pathogens cause fatal diseases in Lepidoptera. Some of the most important pathogens are viruses, bacteria, protozoa, microsporidia, and fungi.

Lepidoptera are equipped with defense mechanisms against such natural enemies. Physical and physiological protective features include stinging hairs in the caterpillar of ***Hemileuca eglanterina* (232)**, camouflage, or crypsis well illustrated by the white, gray, and black tones in the forewing and hindwings of adults such as ***Semiothisa* (30-32)** and ***Itame* (27, 28)**. Behavioral protective features include flashing bright colors or eyespots to startle predators as seen in the hindwings of the noctuid ***Catocala ophelia* (117)**, the sphingid ***Paonias excaecatus* (241)**, and the saturniid ***Antheraea polyphemus* (234)**.

Biodiversity Studies

Information on biodiversity of macromoths is useful for understanding many ecological concerns, in particular, (1) determining food web relationships and the degree of dependency between plants, moths, and predators of moths; (2) recognizing special, rare, or endangered species and habitats; and (3) assessing the impact of land management practices. Two important measures of biodiversity are species richness and abundance of individuals. However, values for these measures require an ecosystem context for insightful interpretation of ecological function. Lepidoptera function in the dynamics of forested ecosystems by serving as defoliators, decomposers, prey or hosts to carnivores, and pollinators (Miller 1993). Therefore it is straight forward that measures such as species richness and abundance can be linked into assessing an ecosystem by documenting how many individuals and how many species are present or absent in a given habitat.

The abundance and species richness of macromoths is readily measured by various sampling techniques including light traps to capture night flying moths, aerial net collecting to capture day flying moths, and clipping or beating foliage to capture caterpillars. We have found that an average of 350 species of macromoths occur in a typical forested site dominated by Douglas-fir. Our record high collection of species from a single trap night was 104, but a count of 20-50 species per trap night is more typical.

A list of the species, plant and animal, present at a given location is an important part of conducting ecological studies; however, a list of species is most meaningful when it is interpreted into components relating each species to various ecological functions. Thus, a species list may be translated into an ecological database by relating life history attributes of the species to each name and then creating functional groups according to the life history attributes and the number of species exhibiting those attributes. For instance, in a comparison of two habitats in the Pacific Northwest, one in western Oregon and the other in eastern Oregon, we found that when the species list was translated into categories of macromoth species according to the host plant of the caterpillar that we could determine the importance of the plant communities on the biodiversity of the macromoths (Hammond and Miller 1998). The macromoth species were classified into three major vegetation groups: (1) conifers, (2) hardwood trees and shrubs, and (3) herbs and grasses.

The results showed that conifers supported only 10-12 percent of the species, whereas flowering trees and shrubs supported 52-66 percent of the species, and herbs-grasses supported 20-33 percent of the species. The most apparent difference between the two sites was in the proportion of individuals associated with an herb-grass feeding habit. The number of individual moths at the drier eastern site was dominated, 55 percent, by individuals that feed on herbs and grasses, whereas only 11 percent of moth abundance in the wetter western site was associated with herbs-grasses. By contrast, abundance of macromoths in the western site was dominated, 69 percent, by hardwood feeders compared with the eastern site where only 39 percent of the macromoths were associated with hardwood plant species.

Handling Moths

COLLECTING

Numerous techniques may be used for collecting moths. One of the most productive approaches is to collect moths from a white sheet placed under or behind an ultraviolet light at night. The moths are attracted to the light and will come to rest on the sheet where they can be easily observed and placed into containers if specimens are desired. A light trap can be assembled so moths may be collected during the entire night without being constantly monitored. Attractants other than ultraviolet light can be used as well, such as, white light, halide lights, fermented baits, commercially available manufactured pheromones, and live virgin females. Day-flying moths are best collected with an aerial net such as those used to collect butterflies.

An excellent means of acquiring moths is to capture live adult females and rear the caterpillars that emerge from her eggs. In some species the female must be coaxed into depositing eggs by providing proper conditions of light, temperature, humidity, flying space, and a substrate for oviposition. Also, moths may be obtained by collecting caterpillars from host plants and rearing them indoors in containers or by placing screen sleeves over the foliage of the host plant in the field. In either situation caterpillars may require some attention regarding suitable foliage for feeding, an appropriate site for pupation, and frequent observation for noting the time of adult emergence so the moth does not damage its wings while being contained.

Careful collecting should be conducted to protect habitat where moths and other organisms live. Avoid trampling plants and disturbing unstable soils. Try to grow plants for the food the caterpillars require or at least prune wild plants with care and an understanding that you may need more foliage later. Collect as few moths as your study requires for accuracy and proper documentation. If possible release specimens back into the environment from which they were acquired once your observations are completed. Do not introduce exotic species and be aware of legal obligations regarding collecting on private and public lands. In particular, heed the importance of protecting rare and endangered species.

REARING

The rearing of caterpillars or the containment of moths for the acquisition of eggs is helpful in associating the caterpillar life stage with the adult life stage, testing food plants for suitability, or associating parasitoids and diseases.

Rearing indoors has numerous advantages and disadvantages. One advantage is that the specimen is less likely to be lost. Another advantage is that the caterpillar will likely grow faster indoors because of warmer temperatures. However, indoor rearing requires that food must be provided by potted plants, clipped foliage from the field, or artificial diets. Unsuitable rearing conditions will result in high mortality. Temperature control, dehydration, fungal growth, starvation, cannibalism, and overcrowding are common problems. Additionally, the use of closed containers may cause problems due to excessive condensation and poor sanitation. The presence of slightly moistened peat moss is helpful at the time of pupation. The peat moss provides a medium within which the caterpillar can bury itself and the moisture helps to prevent dessication, a major obstacle when rearing in dry indoor conditions.

PHOTOGRAPHING

A color slide or print will provide a record of the moth as a substitute or replacement illustration of a specimen. An excellent photograph can be acquired by using all of the following: (1) A 35 mm, single lens reflex camera with exchangeable lenses—Cameras with fixed lenses typically will not allow the photographer to get close to the subject or to fill the frame with a small subject. The photographs presented here were taken with a 50 mm macro lens mounted on a 25 mm extension tube. (2) Film with a low ASA rating or a digital camera that is capable of storing the image directly onto a computer disk—The photographs in this book were taken with color slide film ASA 25. This film speed provides superior quality in grain but requires more light than faster films. (3) A flash system, either a bracket or a ring flash—The moths were photographed with a bracket system consisting of two flash units that are mounted on opposite sides of the camera. The lens, film, and flash units allow shooting pictures of moths at f/16 or f/22 at a distance of about 20 mm from the camera lens. Photographs can be taken in the field but shadows, wind, undesirable backgrounds, and other unwanted features (like other insects) may interfere with obtaining the best picture. All of the moths presented in this booklet were field-collected as an adult or reared from a field-collected caterpillar. However, all moths were photographed in a staged indoor setting. The moth was placed on a spreading board, allowed to dry, the pinned and spread moth was then placed onto the end of a thin wooden dowel with a black background.

CURATING

Moths should be preserved as voucher specimens for eventual study of traits that photographs do not reveal. A properly mounted specimen involves placing an insect pin through the top of the thorax and spreading the forewings and hindwings so that the hind edge of the forewing is at a 90° angle to the body and the front edge of the hindwing is under the forewing so that the tip of the hindwing creates a small notch with the outer edge of the forewing. An excellent example of a nicely spread moth

is ***Acronicta funeralis*** **(129)**. An example of a not so perfect but suitable job of spreading the wings of a moth is ***Hyles lineata*** **(246)** (note that the back edge of the forewing is not perpendicular to the body).

The pinned and spread moth will need to dry for a few days at room temperature. Once dried the forewings and hindwings will stay in place and the moth may be removed from the spreading board and put into an enclosed drawer or cabinet for display. A number of problems may occur, specimens will rot if damp, some colors will fade if subjected to direct sunlight, and museum beetles (dermestids) may turn perfect specimens to dust because the beetles eat dead insects. These problems, and others, can be minimized if the moths are stored in sealed containers and kept in a dark and dry location. Labels on the pinned moth should include at least the details of the place and date that the specimen was collected. See Covell (1984) for additional ideas on curating moths.

NOMENCLATURE

Moths may or may not have a common name and some moths may have two or more common names. The common name of a moth often describes the appearance of the adult or caterpillar, or where it lives, and most often is applied to a species of economic importance: the cinnabar moth, ***Tyria jacobaeae*** **(3)**; the fall webworm, ***Hyphantria cunea*** **(9)**; the Douglas-fir tussock moth, ***Orgyia pseudotsugata*** **(25)**; the satin moth, ***Leucoma salicis*** **(26)**; the green speckled fruitworm, ***Orthosia hibisci*** **(191)**; the pandora moth, ***Coloradia pandora*** **(231)**. Most of the macromoths of western North America do not have a recognized common name.

All officially described species have one, and only one, universally recognized scientific name. The scientific name of all organisms is based in Latin or Greek, consists of at least two parts and often a third, and is italicised when the name occurs in print. For ease of finding names in the text of this book we also put the scientific names in bold print but this is not part of the required protocol for displaying the name. Also, the last name of the author who described the species is sometimes included (not so in this booklet). The first word in a species name refers to the genus and always has the first letter capitalized. The second name, which is not capitalized, is termed the species epithet and in combination with the first name represents the species name, sometimes called the scientific binomen. The same species epithet may be used in a scientific name if the species are in different genera. For instance, the species epithet ***februalis*** is used for a species in ***Egira*** **(194)** and in ***Feralia*** **(166)**. Some species have a third name that indicates a subspecies, providing a scientific trinomen. In general we have not applied subspecies status to our species but for an example of how one might address the situation of subspecies status read the notes associated with ***Stenoporpia pulmonaria*** **(36)**. The status of subspecies is applied to species with two or more distinct populations that are geographically separated. Individuals of different subspecies within a species could interbreed and produce fertile offspring, whereas, populations recognized as separate species typically cannot or do not interbreed. For one example as an exception to the noninterbreeding nature of species note the comments associated with ***Hyalophora euryalus*** **(235)** and a closely related species ***Hyalophora gloveri***.

No two animals are allowed to have the same scientific name. However, species will possess a list of scientific names that are not recognized as the current name due to a history of taxonomic revisions and a variety of expert opinions as to the identity of the species across its range. Previously used scientific names that are no

longer recognized as the current scientific name are called synonyms. Often species with more than one distinct color form will have many synonyms because the various forms were initially thought to be distinct species. Also, as taxonomists revise the organization of species within generic groups the scientific name may change. For instance, Lafontaine (1998) revised the species of the noctuid genera ***Setagrotis*** and ***Tesagrotis***. Prior to his revision the species now recognized as ***Tesagrotis atrifrons* (212)** was known as *Setagrotis atrifrons*. Thus, a search of the literature on this species would need to include both names. Most species have synonyms that are listed in monographs and catalogs. Hodges et al. (1983) lists synonyms of all Lepidoptera in North America.

Macromoth Family Notes

Macromoths representing 12 families of Lepidoptera are commonly collected in the Pacific Northwest. These families are briefly described here. The numbers represent an estimation of the number of species in each family as they occur in the Pacific Northwest. These numbers are estimates because of the dynamics of name changes and recognized species status as well as incomplete species lists for the Pacific Northwest.

ARCTIIDAE - the tiger moths; photographs **1-16**.

30 species. Tiger moths exhibit a wide range of colors and patterns of markings. Some species have immaculate wings while others show large spots or extensive criss-crossing bands. The adults of most species fly at night and are readily attracted to light; however, many of the species will be seen flying during the day. In fact, species of arctiids represent a large portion of the day-flying moths. Caterpillars of some of the species are called woollybears because the typical arctiid caterpillar has a dense coat of long hairs, giving the caterpillars a woolly appearance. Among the species of arctiids, caterpillars may feed on the foliage of conifers, ***Lophocampa argentata*** **(13)**; flowering trees and shrubs, ***Lophocampa maculata*** **(14)**; or herbs, ineluding grasses, ***Cisseps fulvicollis*** **(16)**. Nearly all species overwinter in the caterpillar stage. As previously mentioned many of the arctiids fly during the day. One of the day flying species is the cinnabar moth, ***Tyria jacobaeae*** **(3)**, which was intentionally introduced as a biological control agent because the caterpillar feeds on flowers and leaves of the noxious weed tansy ragwort (*Senecio jacobaea*). ***Lophocampa argentata*** **(13)** typically exhibits a short peak flight period, at any one site lasting perhaps 15 to 20 days within which time a single ultraviolet light trap may collect an excess of 200-300 individuals per night, demonstrating that this species is very abundant but short-lived as an adult. ***Hyphantria cunea*** **(9)**, the fall webworm, is a notorious pest of deciduous trees, including ornamental and orchard species. The Arctiidae of North America are well illustrated in Covell (1984).

DIOPTIDAE - the oak worm moths; photograph **17**.

1 species. ***Phryganidia californica*** **(17)** occurs in forests and woodlands containing live oaks, such as *Quercus chrysolepis*, and chinquapin, *Chrysolepis chrysophylla*, upon which the caterpillars are leaf feeders. Caterpillars overwinter and on warmer

days may feed thus indicating the need for an evergreen host such as live oaks and chinquapin. The species is considered a pest due to occasional episodes of severe defoliation of the host plants. The species may fly at night but is not strongly attracted to light. Also, moths can be found flying during the day.

DREPANIDAE - the hook-tip moths; photograph **18**.

2 species. ***Drepana arcuata* (18)** is common, and ***Drepana bilineata*** is uncommon. The adults fly at night and are readily attracted to light. Caterpillars feed on the foliage of alder (*Alnus*) species.

LASIOCAMPIDAE - the lappet moths; photographs **19-21**.

6 species. The lappet moth body is notably hairy and when at rest they typically hold their wings over the back of their body in a tent-like fashion rather than flat. Colors and markings on the forewings and hindwings of lappet moths do not create strongly contrasting or intricate patterns. The adults fly at night and are readily attracted to light. Lappet moths do not have functional mouthparts and therefore do not feed. Caterpillars of some of the species in the genus ***Malacosoma* (21)** are called tent caterpillars because they spin silken tents within which the caterpillars spend most of their time. Caterpillars of lasiocampids may be found feeding on the foliage of conifers, ***Tolype distincta* (19)**, or flowering trees and shrubs, ***Phyllodesma americana* (20)** and ***Malacosoma californicum* (21)**. There are three species of ***Malacosoma*, *M. californicum* (21)**, ***M. disstria***, and ***M. constrictum***, in the Pacific Northwest, each of which is best identified in the field by the caterpillar. ***Phyllodesma americana* (20)** is readily distinguished by the brick red color of the forewings and hindwings in combination with the scalloped outer edge that is very obvious when the adult is at rest. Similarly, ***Tolype distincta* (19)** is readily distinguished by the hues of white and silver-gray. Franclemont (1973) provides detailed illustrations to the lappet moths of North America.

LYMANTRIIDAE - the tussock moths; photographs **22-26**.

8 species. The adults of most species fly at night and are readily attracted to light; however, some of the species will be seen flying during the day, such as ***Orgyia antiqua* (24)** and ***Orgyia pseudotsugata* (25)**. Females of the two species just mentioned as day flyers are wingless and cannot fly, instead energy and body mass are conserved for the production of eggs. Caterpillars in a majority of the species feed on the foliage of conifers, ***Dasyclira grisefacta* (23)** and ***Orgyia pseudotsugata* (25)**; or flowering trees and shrubs, ***Dasychira vagans* (22)** and ***Leucoma salicis* (26)**. Also, numerous species are considered pests, the most famous being the gypsy moth, ***Lymantria dispar*** (not illustrated here). The gypsy moth has not established permanent populations in the Pacific Northwest but it has created problems when accidentally brought into western North America. An infestation of the gypsy moth can result in an eradication project involving pesticides that in turn may have ecological impacts on other Lepidoptera species (Miller 1990a,b). ***Orgyia pseudotsugata* (25)** is a native pest of conifer forests. Ferguson (1978) provides detailed illustrations and references to the tussock moths of North America.

GEOMETRIDAE - the geometer moths; photographs **27-106**.

400 species. This family is second to the noctuids in containing the most species of Lepidoptera in the Pacific Northwest. The body of geometer moths is thin and more fragile looking than in other macromoths. The forewings and hindwings are broad relative to body size, and flight is typically slow with the beating wings discernible while the moth is in flight. The adults of most species fly at night and are readily attracted to light. Very few species, notably ***Rheumaptera subhastata*** **(93)** and ***Mesoleuca gratulata*** **(94)**, will be seen flying during the day. Females of some species are wingless and cannot fly, for instance ***Operopthera bruceata*** **(101)** and ***Operopthera danbyi*** **(102)**. In some males the antennae are pectinate, see ***Protoboarmia porcelaria*** **(40)** or ***Drepanulatrix foeminaria*** **(49)**. The general condition is to have filiform antennae in both sexes. Caterpillars are called inchworms because they possess prolegs only on the sixth and tenth abdominal segments, requiring the abdomen to bend upward resulting in the body looping forward as the caterpillar is walking. The caterpillars will often wave their body in the air while remaining attached to the substrate by their abdominal prolegs or the caterpillars will remain motionless for hours and may match their surroundings so well that the normal vertebrate eye cannot readily see them.

Many species have caterpillars that feed on the foliage of conifers, in which case the host is usually a range of species in the Pinaceae, but for a few moths a species in the Cupressaceae may be the primary host plant. A majority of the inchworm species feed on the foliage of flowering trees and shrubs, less frequently so on herbaceous plants. Numerous species are considered pests: ***Lambdina fiscellaria*** **(66)** may defoliate vast areas of oak (*Quercus*) and chinquapin (*Chrysolepis chrysophylla*); ***Sabulodes aegrotata*** **(72)** and ***Operopthera bruceata*** **(101)** may feed on ornamentals and orchard crops. Certain of the geometrid genera in the Pacific Northwest are particularly diverse or illustrate interesting evolutionary trends. Species of ***Eupithecia*** **(103-106)** are difficult to identify and may be most easily diagnosed under field conditions according to the host plant of the caterpillar. All species of ***Drepanulatrix*** **(47-49)** feed on various species of *Ceanothus,* and 10 of the 11 species found in North America are endemic to the western United States. Ferguson (1985) provides detailed illustrations and references to the green geometers, Geometrinae, of North America.

NOCTUIDAE - the moths of cutworms, semi-loopers, and underwings; photographs **107-218**.

850 species. This family contains the highest number of species among all families of Lepidoptera in the Pacific Northwest. Overall, species of noctuids range from very small, ***Nola minna*** **(125)** with a wingspan of 2.0 cm, to relatively large, ***Catocala ilia*** **(14)** with a wingspan of 7.9 cm. Similarly, the noctuid moths exhibit a broad array of colors and markings but generally the forewing and hindwings and bodies consist of varying hues of white, silver, gray, tan, brown, and black. Some will show green, ***Feralia*** **(164-166)**, or orange to red as in ***Xestia oblata*** **(209)** and ***Mesogona rubra*** **(159)**. The moths of most noctuid species fly at night and most species are readily attracted to light. Certain species, such as ***Oncocnemis dunbari*** **(170)**, will rarely show up at lights at night, yet collections of caterpillars from the

foliage of ocean spray (*Holodiscus discolor*) suggest individuals of the species are very abundant. A few species of noctuids such as ***Alypia langtoni* (135)** and ***Schinia walsinghami* (21)** have day flying moths. The caterpillars in a majority of the species feed on the foliage of flowering trees, shrubs, or herbs. A few species of ***Syngrapha* (121-124)** and ***Panthea portlandia* (126)** have caterpillars that feed on the foliage of conifers, primarily species of Pinaceae. The feeding site of the caterpillar may differ according to species, in some species such as ***Papaipema insulidens* (143)** caterpillars feed on roots or inside stems. Numerous species are considered pests of agricultural crops but none are considered chronic pests of woodlands and forests.

Certain of the noctuid genera in the Pacific Northwest are particularly diverse or illustrate interesting evolutionary trends. The Plusiinae, ***Eosphoropteryx thyatyroides* (118)**, ***Autographa* (119, 120)** and ***Syngrapha* (121-124)** are a group of noctuids called the semiloopers because the caterpillars are superficially similar to inchworms (Geometridae). The species of semiloopers are characterized by the shape and color of the stigma on the forewing. ***Euxoa* (200-202)** is a genus of cutworms with many species where the caterpillars dwell in the soil and come to the surface to feed on stems and low leaves of herbaceous vegetation. Some of the species of ***Orthosia* (186-191)** and ***Feralia* (164-166)** are among the first moths to fly in the early spring and serve as a signal that winter is over and the season for field studies has begun. Underwing moths, of the genus ***Catocala* (113-117)**, are among the largest noctuids and are characterized by contrasting colors of orange, red, or white with black markings. Illustrated references to the noctuids of North America have been published by Eichlin and Cunningham (1978), Lafontaine (1987), Lafontaine and Poole (1991), Poole (1995), and Lafontaine (1998).

NOTODONTIDAE - the moths of prominents; photographs **219-230**.

20 species. The prominents of North America are not well represented in the Pacific Northwest, with only 20 of the 136 species known to occur in the United States and Canada. The adults fly at night and are readily attracted to light. The caterpillars typically feed on the foliage of flowering trees and shrubs. On occasion ***Schizura concinna* (228)** may be a pest on ornamental trees and in orchards.

SATURNIIDAE - the silk moths; photographs **231-235**.

12 species. The forewing and hindwings of silk moths are very large with wingspans extending to 10 or 15 cm in many of the species. Accordingly the wingbeat of most silk moths is relatively slow, each beat easily seen much like that of most butterflies. Wing colors and markings typically occur in distinct and sometimes intricate patterns, making identification of certain species a simple matter; however, many silk moths are known to have hybrid populations in areas where two closely related species can interbreed. The adults of most species fly at night and are readily attracted to light. A few species, notably ***Hemileuca eglanterina* (232)** and ***Saturnia mendocino* (233)**, will be seen flying during the day. Antennae of silk moths are unique in their morphology of being branched, similar to a fern frond, two or four times. The branched antennae are particularly noticeable in the males. The adults possess atrophied mouthparts and thus do not feed and typically are not long-lived.

Caterpillars are called silkworms but are not the silkworm of commercial silk production. For most species the caterpillars feed on the foliage of flowering trees, shrubs, or herbs; however, the caterpillars of the pandora moth, ***Coloradia pandora*** **(231)**, feed on pine needles. Caterpillars of many species possess stinging hairs that inflict a sharp pain when touched, similar to that received from leaves and stems of nettle (*Urtica*). The species of ***Hemileuca*** **(232)** are some of the stronger flying silk moths. ***Saturnia mendocino*** **(233)** is rare in the Northwest with less than five records known to us north of the California-Oregon border. ***Coloradia pandora*** **(231)** exhibits a life cycle extending across 2 years and thus shows a pattern of major flight episodes every other year. The species is also a notorious pest in pine forests. ***Antheraea polyphemus*** **(234)** possess a colorful peacock-like eyespot near the center of the hindwing. ***Hyalophora euryalus*** **(235)** flies early in the spring, often seen by mid-March. Ferguson (1971, 1972) and Tuskes et al. (1996) provide detailed illustrations and references to the silk moths of North America.

SPHINGIDAE - the sphinx moths, hawk moths; photographs **236-246**.

25 species. Sphinx moths are very strong fliers with their wingbeat producing a sound similar to that of a hummingbird. The strength of flight is evident in the large and firm thorax which houses the flight muscles. The abdomen is also large and firm and is tapered toward the anal end. The forewing of the sphinx moth has the dimensions of a fast flying organism in that the front edge is strongly veined and long, the outer margin angles back to the inner margin giving the wingtip a pointed, tapered outline. This morphology is part of the design of a wing that beats very fast. The adults of most species fly at night and are readily attracted to light. A few species, notably ***Hemaris diffinis*** **(244)**, ***Proserpinus clarkiae*** **(245)** and on occasion ***Hyles lineata*** **(246)**, will be seen flying during the day. Sphinx moths are attracted to flowers that offer nectar and have a long tubular corolla. Many of these flowers are aromatic, white, and flower at night. Caterpillars are known as hornworms. For most species caterpillars feed on the foliage of flowering trees, shrubs, or herbs; however, the caterpillars of ***Sphinx sequoiae*** **(239)** eat junipers (*Juniperus*) and western red cedar (*Thuja plicata*). The species of ***Sphinx*** **(236-239)** are striking in the white, gray, and black markings on the forewings, hindwings, and abdomen. ***Pachysphinx modesta*** **(243)** possess an unusually wide wingspan, exceeding 14 cm in larger specimens. Species of ***Paonias*** **(241, 242)** have colorful eyespots on their hindwing. ***Hemaris diffinis*** **(244)** has extensive areas in the forewing and hindwings that are clear due to a lack of scales. Hodges (1971) provides detailed illustrations and references to the sphinx moths of North America.

THYATIRIDAE - the moths of thyatirids; photographs **247-251**.

10 species. The patterns of the lines on the forewings and hindwings of thyatirids are often strongly wavy, curled, or zig-zagged. For instance, the pattern of lines on the wing of ***Habrosyne scripta*** **(247)** is very intricate and unusual among all Lepidoptera. Similarly, the patches and lines on the wings of ***Euthyatira lorata*** **(249)** are unusual and diagnostic for identification of the species. The adults of thyatirids fly at night and are readily attracted to light. Caterpillars feed on the foliage of flowering trees and shrubs.

EPIPLEMIDAE - the moths of epiplemids; not featured with a photograph.

1 species. ***Callizzia amorata*** is widely distributed in North America and is common in wet forests in the Pacific West. The adults of epiplemids fly at night and are readily attracted to light. Caterpillars feed on the foliage of honeysuckle (*Lonicera*).

Species with Uncommon Features

A restricted number of the species of macromoths in the Pacific Northwest can be readily identified by the presence of very obvious unique colors and patterns. We have compiled a limited selection of these species according to categories that set some of the moths apart from those species that are more difficult to identify because they exhibit the most prevalent colors and less distinct patterns of whites, grays, yellows, tans, browns, and blacks. Our special categories are based on the forewing and hindwings being dominated by a basic color or pattern of markings that are less common among the macromoths. When considered as the dominant color of the wing or body, or both, green, white, or dark gray-black are characteristic of certain species. The markings we find characteristic are eyespots, large polka-dots, bold bands, or the silver-white stigma on the forewing. Lastly, transparent wings, or wings with relatively large transparent areas are also characteristic of certain species. While numerous species can be characterized by solid colors of yellow, tan, red-brown, and gray there are too many species fitting such description thereby making a special list of limited value. Below we list the categories with the names of photographed species that we consider to fit into our groupings of uncommon features.

- Extensive **green** coloration on the forewings, hindwings, and body; other markings may be present and are typically white or black:

  ***Campaea perlata* (57), *Chlorosea banksaria* (76), *Nemoria darwiniata* (77), *Feralia februalis* (166), *Feralia comstocki* (165), *Feralia deceptiva* (164), *Zotheca tranquilla* (153).**

- Extensive **white** coloration and without other markings on the wings:

  ***Leucoma salicis* (26), *Hyphantria cunea* (9), *Spilosoma vestalis* (6), *Campaea perlata* (57).**

- Extensive **dark gray-black** coloration and without small, fine markings on the wings:

  ***Alypia langtoni* (135), *Gnophaela vermiculata* (1), *Rheumaptera subhastata* (93), *Tyria jacobaeae* (3), *Cisseps fulvicollis* (16), *Aseptis fumosa* (140), *Aseptis ethnica* (141), *Dasychira grisefacta* (23).**

- Well defined **eyespots** on the wings:

  ***Antheraea polyphemus* (234), *Saturnia mendocino* (233), *Smerinthus cerisyi* (240), *Paonias excaecatus* (241), *Paonias myops* (242).**

- Large **polka-dots**, primarily on the forewing:

  ***Lophocampa argentata* (13), *Platyprepia virginalis* (10), *Arctia caja* (11).**

- Extensive **bold bands**, typically black:

  ***Grammia ornata* (12), *Hemilenca eglanterina* (232).**

- Extensive **transparent areas** in the wings:

  ***Hemihyalea edwardsii* (15), *Hemaris diffinis* (244).**

- Distinct **silver-white stigma** on the forewing (Noctuidae: Plusiinae):

  ***Eosphoropteryx thyatyroides* (118), *Autographa corusca* (119), *Autographa speciosa* (120), *Syngrapha epigaea* (121), *Syngrapha orophila* (122), *Syngrapha rectangula* (123), *Syngrapha celsa* (124).**

Species Descriptions

The photographs of moths are organized according to a family-based scheme, following Hodges et al. (1983), which places closely related species next to one another rather than by obvious features such as colors and patterns. Many of the species that belong in closely related groups tend to exhibit some similarity in certain features that may be useful in the sense of a field guide where identifications are attempted without the aid of magnification or a detailed knowledge of morphology.

While many of the moths illustrated here are common, only a small percentage of the species in the Northwest are represented. You may collect a specimen that does not match any of the photographs or fit any of the descriptions of similar species in this publication. If you cannot determine the identity of a macromoth from the western United States, then look in Covell (1984). Covell (1984) provides an extensive assortment of photographs for species that occur in the eastern United States, so the probability of a match to a western species is limited to those species that are widespread across the North American continent. Also, serious students of moths should look in the references cited at the end of the discussion of each family in the section on Macromoth Family Notes.

For each of the 251 species presented with a photograph of the adult, we provide a narrative that includes (1) the wingspan of a typical adult, (2) a description of diagnostic morphological traits, (3) comments on relative abundance, (4) biogeographical range and general habitat, (5) flight period, (6) caterpillar host plants, and (7) similar species.

WINGSPAN

Size of the moths in the pictures is difficult to compare among species because the images were taken to maximize the size of the moth to the dimensions of the photograph. Thus, small moths appear to be the same size as large moths. Note that the image of ***Eurois astricta*** **(208),** a relatively large moth, is similar in size to the image of ***Xestia oblata*** **(209)** which in reality are much smaller moths. Because maximizing the size of each image was a high priority we offer a measure of a typical wingspan for each species. Using the example of ***Eurois astricta*** **(208)** with a wingspan of 5.3 cm the size difference becomes apparent when compared with the 3.8 cm wingspan of ***Xestia oblata*** **(209)**.

The measurements for wingspans were taken from properly spread specimens of typical size for the species. The distance from the tip of the left forewing to the tip of the right forewing was used to represent the wingspan and is presented with a resolution to within 1 mm. We did not attempt to assess the statistical distribution of wingspan values for each species but in general most species will exhibit a size range of 15 - 20 percent above and below the average value. Thus, it should not be surprising to collect a moth slightly smaller or slightly larger than the dimensions presented in the species diagnostic traits.

SPECIES DIAGNOSTIC TRAITS

The field identification of species of macromoths may be conducted by comparing combinations of features involving colors, patterns, or shape of the wings, head, thorax, and abdomen.

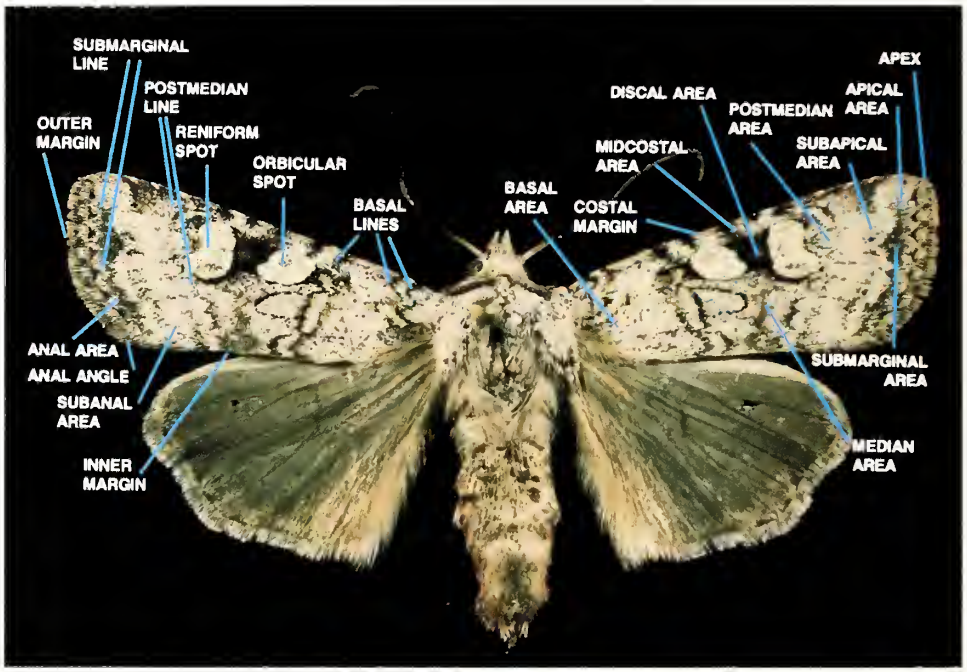


Figure 1. The areas, margins, lines and spots on the forewing are most useful for identification of species of macromoths. Photograph is of ***Euxoa vetusta*** **(200).**

Wings. We use certain terms to describe the appearance of forewing patterns according to their utility in distinguishing species (Figure 1). The most important of these features are dashes, lines, bands, patches, special spots, and special areas. Dashes are narrow, short marks extending less than half the distance along the width or length of the wing. Lines are narrow marks extending more than half the distance along the width or length of the wing and are associated with a particular area on the wing. Bands are a wide area typically extending more than half the distance along the width or length of the wing and often demarked by lines and are associated with a particular area on the wing. Patches are a small, restricted area of the wing demarked by a distinct color but not delimited by lines. Basal lines occur in the basal area. The postmedian line may be broken or continuous and occurs distal to the reniform spot and demarks the proximal edge of the postmedian band. The submarginal line may be broken or continuous and is proximal to the outer margin. The orbicular spot is a single irregularly shaped (typically near-round shaped) spot that occurs just short of half way along the front edge of the forewing. The reniform spot is a single irregularly shaped (often kidney shaped) spot that occurs just past half way along the front edge of the forewing. The discal spots are the combination of the reniform and orbicular spots. The basal area is the area of the wing nearest the thorax. The midcostal area is in the center of the front edge of

the wing below the costal margin. The discal area is between the orbicular and reniform spots. The median area is the central area of the wing. The postmedian area is distal to the reniform spot and proximal to the subapical area. The subapical area is proximal to the apical area. The apical area is immediately below the apex of the wing. The submarginal area is proximal to the outer margin. The anal area is between the outer margin and the inner margin, proximal to the anal angle. The subanal area is proximal to the anal area.

Head. The most obvious features on the head involve the eyes, mouthparts, and antennae. In general, these body parts are not the most useful features for field identification of macromoth species. However, the presence of pectinate antennae can be useful in identifying similar looking species. For instance, the male of ***Pero occidentalis* (53)** has pectinate antennae while the male of a similar appearing species, ***Pero behrensaria***, has filiform antennae.

Thorax. The thorax has three segments: prothorax, nearest the head; mesothorax, in the middle; and metathorax, connecting to the abdomen. The forewings attach to the mesothorax, and the hindwings attach to the metathorax. The thorax may have hairs arranged by colors and lengths to form the presence of collars and tufts that may be used to differentiate species. For instance, the pale yellow thoracic collar of ***Cerastis enigmatica* (205)** is diagnostic relative to other similar looking moths. Also, identification maybe aided by features of the legs, one pair of which occurs on each thoracic segment, namely colors of hairs [see ***Spilosoma vestalis* (6)**]. The forewing and hindwings provide very useful traits for field identification of macromoth species.

Abdomen. The general size and shape of the abdomen is more characteristic of the macromoth family than it is useful in identification of species. For instance, the abdomen of geometrids is typically thin and appears small relative to the wing area. On the other hand, the abdomen of sphingids is robust and distinctly tapered. Because the abdomen is the body segment that contains the genitalia, which are used in describing and differentiating species, the abdomen is of great importance to expert taxonomists. Therefore, it may not be possible to identify certain specimens if the abdomen is missing.

ABUNDANCE

Our comments on abundance are based on how prevalent individuals of a given species are at peak flight periods, in suitable habitat, and within their normal range. We use general terms: abundant, common, uncommon, and rare. Abundant indicates that hundreds of individual moths may be collected in one night of operating a single light trap or that day flying moths may be seen by the dozens within an hour of observation. A designation of common indicates that moths are typically collected in numbers of less than a hundred per night to as few as zero or one on any given night but frequently seen throughout the flight period. Uncommon moths are those species that occur in low numbers, usually no individuals or 1 per trap per night and less than 10-15 per trap throughout the flight period. A rare moth may not be seen in any given year or multiple years, and when observed only a few individuals are noted. As an example, we have observed only a few individuals of ***Saturnia mendocino* (233)** during the last decade.

BIOGEOGRAPHICAL RANGE AND GENERAL HABITATS

We have used a scaling of geography in our descriptions of each species as follows: coastal refers to the west side of the coast mountains, Pacific West refers to west of the Cascade Mountains and Sierra Nevada, Pacific Northwest as described in the introduction, and western North America refers to west of the Rocky Mountains.

The woodlands and forests of the Pacific Northwest possess many types of habitats based on tree species, geographical location, and climatic conditions. We have placed these woodland and forest types into five categories: (1) subalpine forest, (2) wet forest, (3) dry forest, (4) dry woodland, and (5) riparian forest and woodland.

Subalpine forest. This forest type occurs at high elevation, above 1,500 m, in the Cascade Mountains, Rocky Mountains, and Sierra Nevada, and as isolated montane islands in the Great Basin and the southwest states. Dominant tree species are Engelmann spruce, subalpine fir, lodgepole pine, and quaking aspen.

Wet forest. This forest type is dominated by conifers, particularly Douglas-fir, western hemlock, redwoods, and Sitka spruce. The major hardwood trees are red alder, and big-leaf maple.

Dry forest. This forest type is dominated by ponderosa pine. The associated hardwood trees are quaking aspen in high elevation sites and cherry and serviceberry at lower elevation sites.

Dry woodland. This habitat is characterized by oak woodlands west of the Cascade and Sierra Nevada Mountains and juniper woodlands to the east of the Cascade Mountains. The dry woodland habitat in the Southwest and Great Basin are characterized by pinyon pine.

Riparian forest and riparian woodland. This habitat occurs in dry regions along rivers, creeks, and gullies. The dominant trees are poplars, willow, alder, cherry, and elderberry.

FLIGHT PERIOD

The time of day or night, and the season when a moth flies can be very specific and limited or cover a wide range. Moths may switch between active and inactive periods based on the time of day. Diurnal moths are active during the day and nocturnal moths are active during the night. We have included statements only with reference to day flying activity; therefore, if not stated, the species is a night flying moth.

Seasonal activity may be generally categorized by the standard periods of spring, summer, fall, and winter. Further detail may be added by stating whether the flight period extends into an early or late part of any of the seasons. The seasonal period for flight is mentioned only in general terms because different geographical locations will exhibit different seasonal conditions based on latitude, longitude, elevation, and slope. In general we note the relativity of the seasons based on the western valleys and foothills: spring is February through June, summer is July and August, fall is September through November, and winter is December and January.

CATERPILLAR HOST PLANTS

Caterpillars, with rare exception, are herbivorous meaning they feed on plants. Most typically caterpillars feed on foliage, but also on roots, within branches and woody stems, in seeds, and on flowers. The caterpillars of many macromoth species may have restricted ranges of suitable host plants upon which they can feed. Such species are termed monophagous or host plant specialists. In such cases the caterpillar may feed on only one species, on only a few related species, or on many species within one genus of plant. For instance, any of the species of ***Drepanulatrix*** **(47-50)** will feed only on species of *Ceanothus*.

On the other hand, many caterpillars are generalist feeders and are termed polyphagous. That is, the caterpillar can feed upon many plant species among a wide range of plant species and still develop into an adult in the usual period of time and achieve normal size. Generalist feeders often are able to live on plant species belonging to a wide array of families. For instance, the caterpillars of ***Neoalcis californiaria*** **(35)**, ***Hesperumia sulphuraria*** **(33)**, and ***Aseptis binotata*** **(142)** can develop on 15 to 23 plant species belonging to 10-12 plant families. Although caterpillars may be polyphagous they exhibit preferences for certain host plant species. For instance, caterpillars of ***Neoalcis californiaria*** **(35)** feed on the foliage of conifers and the foliage of flowering plants but each host plant is not equally suitable for growth and more caterpillars can be found on Douglas-fir than any other of the known host plants.

SIMILAR SPECIES

When other species exhibit a similar appearance to that of the featured species we note diagnostic traits for differentiating the species from one another. Sometimes the wing patterns can be used, in other cases the caterpillar host plant or the flight period and geographical range may provide diagnostic traits. Similar species are identified to family only if they belong in a different genus and not one of the numbered species accompanied by a photograph. In discussing some species we did not list any similar species because in our judgment no other species look enough like the featured species to warrant additional diagnostic traits. If a moth in hand doesn't match the photograph of a species, then perhaps the identity of the moth is one of the similar species or a species not mentioned in this publication. We do not cover many of the rare species and mention only a few of the species placed in the larger genera, such as the noctuid genus ***Euxoa*** **(200-202)** and the geometrid genus ***Eupithecia*** **(103-106)**.

MACROMOTH SPECIES

ARCTIIDAE

1. *Gnophaela vermiculata*

Wingspan 5.4 cm. Wings with white patches outlined by black veins on a black background. This arctiid is common and widely distributed at mid elevations among the mountain ranges of western North America. Moths fly during the day in midsummer. Caterpillars feed on foliage and flowers of bluebells (*Mertensia*).

Similar species: ***Gnophaela latipennis*** has white patches on the wings reduced to small spots, caterpillars feed on foliage of hound's tongue (*Cynoglossum*); ***Alypia langtoni*** **(135)** is smaller, wings black with white patches, caterpillars feed on foliage of fireweed (*Epilobium*).

2. *Clemensia albata*

Wingspan 2.4 cm. Forewing is white with a mottled pattern of fine black lines and spots. This arctiid is common in woodlands and forests west of the Cascade Mountains. Moths fly in late summer. Caterpillars feed in lichens on trees and large shrubs, caterpillars are common on Oregon white oak (*Quercus garryana*) upon which they also may feed on the foliage.

Similar species: some ***Eupithecia***, such as ***Eupithecia misturata*** **(103)**, are similar in size and coloration but show different markings on the wings.

3. *Tyria jacobaeae*

Wingspan 3.7 cm. Forewing is dark gray-black with a red costal stripe and two red submarginal spots; hindwing all red; abdomen black. This species was intentionally introduced from Europe for control of a noxious weed, tansy ragwort (*Senecio jacobaeae*). This arctiid is very common west of the Cascade Mountains. Moths fly during the day in May and June. Caterpillars feed on foliage and flowers of *Senecio*.

Similar species: ***Phragmatobia fuliginosa*** (Arctiidae) forewing is light brown, hindwing is red with a black submarginal band, abdomen is red with a dorsal black stripe.

4. *Leptarctia californiae*

Wingspan 3.0 cm. Forewing is black with small white spots; hindwing is all black or with variable amounts of black bands and white, yellow, orange, or red markings. This arctiid is common and widely distributed in western North America but seems to occur in local colonies. Moths fly during the day in late May through June. Caterpillars are generalist feeders on foliage of herbaceous plants.

5. *Pyrrharctia isabella*

Wingspan 5.3 cm. Wings with small black spots; forewing is mustard-yellow; hindwing is yellow-orange. This arctiid is widely distributed in western North America and is particularly common west of the Cascade Mountains. Moths fly in midsummer. Caterpillars are generalist feeders on foliage of herbaceous plants such as nettle (*Urtica*).

6. *Spilosoma vestalis*

Wingspan 5.2 cm. Wings and abdomen white with small black spots (top photo); femur of foreleg with red hairs (bottom photo). This arctiid is common west of the Cascade Mountains. Moths fly in late May and June. Caterpillars are generalist feeders on foliage of flowering trees, particularly oak (*Quercus*).

Similar species: ***Spilosoma virginica*** has orange-yellow femur on foreleg and yellow bands on the abdomen; ***Hyphantria cunea*** **(9)** has immaculate white wings; ***Leucoma salicis*** **(26)** wings are immaculate and satin white, abdomen gray-black, legs with alternating black and white marks.

7. *Spilosoma vagans*

Wingspan 3.8 cm. Wing coloration ranges from orange-red to gray-tan. This arctiid is common and widely distributed in western North America, often abundant in the Blue Mountains. Moths fly in spring to early summer. Caterpillars are generalist feeders on foliage of herbaceous plants.

Similar species: ***Spilosoma pteridis*** **(8)** is smaller with darker pigmented wings.

8. *Spilosoma pteridis*

Wingspan 3.2 cm. Forewing and thorax with mixed shades of red and black. This arctiid is common west of the Cascade Mountains. Moths fly in late May and June. Caterpillars are generalist feeders on foliage of herbaceous plants.

Similar species: ***Spilosoma vagans*** **(7)** is larger with lighter coloring in the wings ranging from red-orange to gray-tan.

9. *Hyphantria cunea*

Wingspan 3.4 cm. Wings are white with no other markings; abdomen yellow-white; ventral side of prothorax and femur of foreleg with orange hairs. This arctiid is widely distributed in western North America and is at times considered a pest. Moths fly in midsummer. Caterpillars are generalist feeders on foliage of flowering trees, including many ornamental species, where they live within silken tents and have the common name of fall webworm.

Similar species: ***Spilosoma virginica*** wings without spots, yellow bands on the abdomen; femur of foreleg with yellow-orange hairs; ***Spilosoma vestalis*** **(6)** wings immaculate, femur of foreleg with red; ***Leucoma salicis*** **(26)** wings immaculate and satin white, abdomen gray-black, legs with alternating black and white marks.

10. *Platyprepia virginalis*

Wingspan 6.2 cm. Forewing is black with many large and round yellow spots; hindwing is variable, either orange with black bands or mostly black with orange spots; thorax is black with dorsal-anterior patches of yellow. This arctiid is common in meadows of western North America. Moths fly during the day in early summer. Caterpillars are generalist feeders on foliage of herbaceous plants.

Similar species: ***Platarctia parthenos*** (Arctiidae) forewing is brown with small yellow spots, thorax is red-brown, uncommon and restricted to the northern Rocky Mountain region including the Blue Mountains.

11. *Arctia caja*

Wingspan 6.5 cm. Forewing is brown with irregular white bands; hindwing is orange with round black spots. This arctiid is uncommon but widely distributed at lower elevations in western North America. Moths fly in midsummer. Caterpillars are generalist feeders on foliage of herbaceous plants and small flowering shrubs.

12. *Grammia ornata*

Wingspan 4.3 cm. Forewing is black with narrow yellow-red streaks; hindwing is red-orange with a black border and central black spots of variable proportions; head is yellow with the thorax striped in yellow and black. This arctiid is common and widely distributed in western North America. Moths fly in early summer. Caterpillars are generalist feeders on foliage of herbaceous plants.

Similar species: ***Grammia behrii*** hindwing with few black marks, head and thorax black, uncommon and occurs in California and southwest Oregon; ***Grammia nevadensis*** hindwing is pale pink, common in juniper woodlands east of the Cascade Mountains.

13. *Lophocampa argentata*

Wingspan 4.1 cm. Forewing is gold-brown with silvery white spots; hindwing is off white, nearly immaculate; abdomen yellow. This arctiid is abundant west of the Cascade Mountains, less common elsewhere. Moths fly in late July and early August. Caterpillars feed on foliage of Pinaceae, in particular pine (*Pinus*), fir (*Abies*), and Douglas-fir (*Pseudotsuga menziesii*).

Similar species: ***Lophocampa maculata*** **(14)** forewing yellow with brown bands; ***Hemihyalea edwardsii*** **(15)** forewing semitransparent with black markings and a red-pink abdomen. Both of these species feed on foliage of flowering trees, particularly oak (*Quercus*).

14. *Lophocampa maculata*

Wingspan 4.5 cm. Forewing is yellow with brown bands; hindwing is immaculate; abdomen yellow. This arctiid is common and widely distributed in western North America. Moths fly in midsummer. Caterpillars are generalist feeders on foliage of flowering trees and shrubs, in particular, oak (*Quercus*), alder (*Alnus*) and maple (*Acer*).

Similar species: ***Lophocampa argentata*** **(13)** forewing gold-brown with silver-white spots, caterpillars feed on foliage of Pinaceae; ***Hemihyalea edwardsii*** **(15)** wings are semitransparent with black markings, abdomen red-pink.

15. *Hemihyalea edwardsii*

Wingspan 6.5 cm. Wings are semitransparent, creamy yellow-orange with faint black markings; thorax is yellow; abdomen is red-pink. This arctiid is common in oak woodlands in California and western Oregon. Moths fly in September. Caterpillars feed on foliage of oak (*Quercus*).

Similar species: ***Lophocampa maculata*** **(14)** and ***Lophocampa argentata*** **(13)** both lack semitransparent wings and possess a yellow abdomen.

16. *Cisseps fulvicollis*

Wingspan 3.6 cm. Forewing is brown; hindwing is brown along outer margin; body is black with an orange-yellow collar behind the head. This arctiid is common and widely distributed in western North America. Moths fly during the day in summer. Caterpillars occur in wet conifer grasslands feeding on foliage of grasses, sedges, and rushes.

Similar species: ***Ctenucha rubroscapus*** (Arctiidae) wings solid black with white margins, head and front edge of thorax red, abdomen metallic blue, moths fly during the day in wet meadows where caterpillars feed on grasses and sedges.

DIOPTIDAE

17. *Phryganidia californica*

Wingspan 4.0 cm. Forewing tan-light brown with a yellow median patch. This dioptid is common and distributed in dry woodlands in the Pacific West. Moths fly during summer. Caterpillars feed on the foliage of oak (*Quercus*) and chinquapin (*Chrysolepis chrysophylla*).

DREPANIDAE

18. *Drepana arcuata*

Wingspan 3.7 cm. Forewing is pale yellow-brown with a smooth outer margin and hooked at the apex, postmedian line is narrow. This drepanid is common west of the Cascade Mountains. Moths fly from May to August. Caterpillars feed on foliage of alder (*Alnus*).

Similar species: ***Drepana bilineata*** is less common, forewing with two narrow median lines, outer wing margin is scalloped.

LASIOCAMPIDAE

19. *Tolype distincta*

Wingspan 3.3 cm. Forewing is pale gray with dark gray bands and white veins. This lasiocampid is common and widely distributed in western North America. Moths fly in late summer and fall. Caterpillars feed on the foliage of species of Pinaceae.

Similar species: ***Tolype glenwoodi*** tends to lack the white wing veins, caterpillars feed on Gambel's oak (*Quercus gambelii*) in the southern Rocky Mountains.

20. *Phyllodesma americana*

Wingspan 3.6 cm. Forewing is red-brown with fine spots and a deeply notched anal margin; hindwing is small with a dentate margin. This lasiocampid is common and widely distributed in western North America. Moths fly in late spring to early summer. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs, particularly alder (*Alnus*), snowbrush (*Ceanothus velutinus*), chinquapin (*Chrysolepis chrysophylla*), and oak (*Quercus*).

21. *Malacosoma californicum*

Wingspan 2.9 cm. The male (photo) forewing and hindwing is variably dark red-brown to yellow with two narrow lines and hindwing is dark red-brown; female forewing and hindwing is more yellow with red-brown shading. This lasiocampid is very common and widely distributed in western North America. Moths fly in midsummer. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs, particularly bitterbrush (*Purshia tridentata*), snowbrush (*Ceanothus velutinus*), maple (*Acer*), alder (*Alnus*), and oak (*Quercus*).

Similar species: ***Malacosoma disstria*** wings are typically yellow or pale brown, common and widely distributed, caterpillars are generalist feeders on foliage of flowering trees and shrubs.

LYMANTRIIDAE

22. *Dasychira vagans*

Females are wingless. The male wingspan is 4.5 cm. Forewing is gray with pale mottling, no white subanal spot. This lymantriid is common and widely distributed in western North America. Moths fly from early to late summer. Caterpillars are generalist feeders on the foliage of flowering trees, particularly oak (*Quercus*) and maple (*Acer*).

Similar species: ***Dasychira grisefacta*** **(23)** with darker wings and a white subanal spot on the forewing, caterpillars feed on foliage of species of Pinaceae; species of ***Gluphisia*** **(223, 224)** have banded markings on the forewing and no subanal spot.

23. *Dasychira grisefacta*

Females are wingless. The male wingspan is 4.2 cm. Forewing is light gray to black with a small white subanal spot in the postmedian area. This lymantriid is usually uncommon but widely distributed in western North America. Moths fly in mid to late summer. Caterpillars feed on the foliage of species of Pinaceae, particularly Douglas-fir (*Pseudotsuga menziesii*) and grand fir (*Abies grandis*).

Similar species: ***Dasychira vagans* (22)** wings light gray and without a subanal white spot, caterpillars are generalist feeders on foliage of flowering trees, particularly oak (*Quercus*) and maple (*Acer*); species of ***Gluphisia* (223, 224)** have banded markings on the forewing and no subanal spot.

24. *Orgyia antiqua*

Females are wingless. The male wingspan is 3.0 cm. Forewing is red-brown with a large white subanal spot in the postmedian area, hindwing red-orange to orange-brown. This lymantriid is known as the antique tussock moth and is common and widely distributed in western North America. Moths fly in late summer to fall. Caterpillars are generalist feeders on the foliage of flowering trees in the Rosaceae, Fagaceae, Ericaceae, and Salicaceae.

25. *Orgyia pseudotsugata*

Females are wingless. The male wingspan is 3.3 cm. Forewing is gray to black with a small subanal spot; hindwing is dark red-brown. This lymantriid is known as the Douglas-fir tussock moth and is considered a forest pest causing severe defoliation of certain conifer species and is widely distributed in western North America. Moths fly in midsummer to fall. Caterpillars feed on the foliage of species of Pinaceae, in particular Douglas-fir (*Pseudotsuga menziesii*) and true fir (*Abies*).

Similar species: ***Orgyia vetusta*** occurs in the Pacific West while ***Orgyia cana*** is widely distributed, both species have wingless females, males with a gray brown forewing and a dark brown hindwing, caterpillars feed on foliage of flowering trees and shrubs.

26. *Leucoma salicis*

Wingspan 5.2 cm. Forewing with a satin sheen, silk white with light yellow costal and basal areas; leg hairs colored in black and white rings. This lymantriid is known as the satin moth and was accidentally introduced from Europe and is now common and widely distributed in western North America. Moths fly in midsummer. Caterpillars feed on the foliage of willow (*Salix*), and poplar and aspen (*Populus*).

Similar species: ***Spilosoma vestalis*** **(6)** femur of foreleg with red hairs; ***Spilosoma virginica*** and ***Hyphantria cunea*** **(9)** femur of foreleg with yellow hairs.

GEOMETRIDAE

27. *Itame quadrilinearia*

Wingspan 2.8 cm. Forewing is gray with fine dark lines, also with a bright yellow patch along the costal margin on the venter (not shown) of the forewing. This geometrid is common and widely distributed in western North America. Moths fly in midsummer. Caterpillars feed on the foliage of snowbrush (*Ceanothus velutinus*) and deerbrush (*Ceanothus integerrimus*).

Similar species: ***Itame*** is a large genus with at least 30 species in western North America, many of the species are similar in appearance but differ in caterpillar host plants; ***Itame bitactata*** wings are gray with jagged black bands, caterpillars feed on foliage of currant (*Ribes*); ***Itame confederata*** wings are pale brown, caterpillars feed on foliage of cherry (*Prunus*); ***Itame plumosata*** wings are pale yellow with brown blotches, caterpillars feed on foliage of maple (*Acer*); ***Itame brunneata*** wings are brown-yellow, caterpillars feed on foliage of huckleberry (*Vaccinium*).

28. *Itame colata*

Wingspan 2.3 cm. Forewing is gray with a broad brown postmedian band curved and outlined in black. This geometrid is common and widely distributed in pine forests and juniper woodlands of western North America. Moths fly in mid to late summer. Caterpillars feed on the foliage of bitterbrush (*Purshia*) and sagebrush (*Artemisia*).

Similar species: ***Itame decorata*** is larger, forewing is mottled gray, occurs at higher elevations in the Cascade Mountains, caterpillars feed on foliage of currants (*Ribes*); species of ***Semiothisa*** **(30-32)** lack the brown postmedian band.

29. *Elpiste lorquinaria*

Wingspan 2.8 cm. Forewing with falcate apex, pale yellow or brown with two narrow lines and three black marks in the submarginal area. This geometrid is common and widely distributed in wet forests of the Pacific Northwest. Moths fly in late summer. Caterpillars feed on the foliage of alder (*Alnus*), aspen (*Populus*), and willow (*Salix*).

Similar species: ***Elpiste metanemaria*** lacks the sharply defined markings on the forewing and is limited to coastal forests of Oregon and California; some species, other than those discussed herein, of ***Itame*** and ***Semiothisa*** are similar but lack the three submarginal spots of ***E. lorquinaria***.

30. *Semiothisa adonis*

Wingspan 3.2 cm. Forewing is slightly falcate with three narrow black bands; basal and median areas are gray, postmedian area is red-orange; hindwing is strongly dentate. This geometrid is common and widely distributed in pine forests of western North America. Moths fly in midsummer. Caterpillars feed on the foliage of pine (*Pinus*).

31. *Semiothisa signaria*

Wingspan 3.0 cm. Forewing is slightly falcate, mottled pale brown with three dark lines and a black postmedian patch; hindwing is slightly dentate. This geometrid is abundant and widely distributed in western North America. Moths fly in midsummer. Caterpillars feed on the foliage of species of Pinaceae.

Similar species: ***Semiothisa unipunctaria*** is larger, wings gray, occurs in high elevation conifer forests, caterpillars feed on the foliage of species of Pinaceae; ***Semiothisa sexmaculata*** is smaller, wings uniformly dull brown with obscure markings, abundant and widespread, caterpillars feed on the foliage of western larch (*Larix occidentalis*); ***Semiothisa ulsterata*** forewing is falcate, deeply notched, mostly white with a red subapical and black postmedian patch, hindwing dentate, moths are common in wet conifer forests in the Pacific West, caterpillars feed on the foliage of alder (*Alnus*) and birch (*Betula*).

32. *Semiothisa respersata*

Wingspan 2.8 cm. Forewing is pale mottled brown with three narrow dark lines, forewing and hindwing with smooth margins. This geometrid is abundant in oak woodlands in the Pacific West. Moths fly in summer. Caterpillars feed on the foliage of oak (*Quercus*).

Similar species: ***S. respersata*** serves to represent a large group of over 30 similar species of ***Semiothisa*** that are widely distributed in western North America, many of these species utilize different caterpillar food plants. Some of the more common species include ***Semiothisa setonana*** on juniper (*Juniperus*); ***Semiothisa burneyata*** on Cupressaceae, particularly incense cedar (*Calocedrus decurrens*) and western red cedar (*Thuja plicata*); ***Semiothisa denticulata*** on Rosaceae; and ***Semiothisa neptaria*** on Salicaceae; ***Itame colata*** **(28)** with a brown postmedian band.

33. *Hesperumia sulphuraria*

Wingspan 3.5 cm. Forewing is a pale to dark yellow with purple-brown median and basal bands and a broad purple-brown discal spot; markings are variable from very prominent bands to nearly no marks except for the discal spot. This geometrid is common and widely distributed in western North America. Moths fly in midsummer. Caterpillars are generalist feeders on the foliage of many flowering trees and shrubs, such as snowbrush (*Ceanothus velutinus*), manzanita (*Arctostaphylos*), ocean spray (*Holodiscus discolor*), bitterbrush (*Purshia tridentata*), currant (*Ribes*), and huckleberry (*Vaccinium*).

Similar species: ***Neoterpes trianguliferata*** (Geometridae) forewing strongly falcate and yellow with two purple costal bands, widely distributed in western North America, caterpillars feed on foliage of currant (*Ribes*).

34. *Hesperumia latipennis*

Wingspan 3.5 cm. Forewing is a uniform pale gray with a narrow, sharply dentate median line. This geometrid is common, particularly west of the Cascade Mountains. Moths fly in midsummer. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs such as buckbrush (*Rhamnus purshiana*), ocean spray (*Holodiscus discolor*), elderberry (*Sambucus*), and snowberry (*Symphoricarpos albus*).

Similar species: ***Melanolophia imitata*** **(41)** has less gray on the forewing, moths fly in early spring.

35. *Neoalcis californiaria*

Wingspan 3.6 cm. Forewing is mottled cream to dark brown with wavy dark median and basal lines. This geometrid is common and occurs west of the Cascade Mountains. Moths fly in late summer into fall. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs, such as maple (*Acer*), alder (*Alnus*), oak (*Quercus*), rose (*Rosa*), and huckleberry (*Vaccinium*), and the foliage of many conifers, such as Douglas-fir (*Pseudotsuga menziesii*) and fir (*Abies*).

Similar species: among the species that have similar gray, brown, and white colors with wavy black lines, ***N. californiaria*** is characterized by its late flight period and overwintering caterpillars.

36. *Stenoporpia pulmonaria*

Wingspan 4.0 cm. Forewing of our subspecies, ***Stenoporpia pulmonaria albescens***, is white to gray with wavy black lines. This subspecies occurs in wet conifer forests in the Pacific West. Moths fly in late summer and early fall. Caterpillars feed on the foliage of species of Pinaceae.

Similar species/subspecies: many species have similar gray, brown, or white colors with fine, wavy black lines but species of ***Stenoporpia*** are characterized by their larger size; ***Stenoporpia pulmonaria dejecta*** wings are mottled with red-purple colors, occurs in pine forests in western North America, caterpillars feed on ponderosa pine (*Pinus ponderosa*); ***Stenoporpia pulmonaria pulmonaria*** occurs in the southern Rocky Mountains; ***Stenoporpia separataria*** forewing with wavy lines, moths fly in late spring to early summer; ***Stenoporpia excelsaria*** forewing with straight lines, moths fly in late spring to early summer.

37. *Iridopsis emasculata*

Wingspan 3.5 cm. Forewing is pale gray-cream with narrow wavy black lines and a brown patch bordered by two black tooth-like marks in the subapical area. This geometrid is common and widely distributed in western North America. Moths fly in midsummer. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs, such as alder (*Alnus*), and huckleberry (*Vaccinium*).

Similar species: numerous species exhibit similar shades of gray, brown, and white colors with fine wavy black lines such as ***Aethaloida packardaria*** **(55)**, ***Anavitrinella pampinaria*** **(38)**, ***Biston betularia*** **(42)**, and ***Ectropis crepuscularia*** **(39)**, however, ***I. emasculata*** is distinguished by the subapical brown patch with black markings.

38. *Anavitrinella pampinaria*

Wingspan 3.4 cm. Forewing is pale gray or brown with fine wavy black lines. This geometrid is widely distributed in forests of western North America. Moths fly in early summer. Caterpillars feed on foliage of buckbrush (*Ceanothus cuneatus*) and deerbrush (*Ceanothus integerrimus*).

Similar species: numerous species exhibit similar shades of gray, brown, and white colors with fine wavy black lines, such as ***Aethaloida packardaria*** **(55)**, and ***Iridopsis emasculata*** **(37)**, however, ***A. pampinaria*** is distinguished by its relatively small size and pale gray color.

39. *Ectropis crepuscularia*

Wingspan 4.1 cm. Forewing is white with fine, dentate black lines. This geometrid is common and widely distributed in western North America. Moths fly in spring. Caterpillars feed on the foliage of flowering trees and shrubs, such as alder (*Alnus*), willow (*Salix*), and snowberry (*Symphoricarpos albus*), and conifers, such as Douglas-fir (*Pseudotsuga menziesii*) and western hemlock (*Tsuga heterophylla*).

Similar species: many species in at least twelve genera of Geometridae, such as, ***Aethaloida packardaria*** **(55)**, ***Anavitrinella pampinaria*** **(38)**, and ***Biston betularia*** **(42)** have similar colors and markings, however, ***E. crepuscularia*** is distinguished by the fine dentate marks along the black lines.

40. *Protoboarmia porcelaria*

Wingspan 3.0 cm. Forewing is pale mottled brown with faint dentate median and submarginal lines. This geometrid is widely distributed in wet conifer forests. Moths fly in midsummer. Caterpillars feed on the foliage of species of Pinaceae, notably Douglas-fir (*Pseudotsuga menziesii*).

Similar species: ***Melanolophia imitata*** **(41)** is larger, moths fly in early spring; ***Anavitrinella pampinaria*** **(38)** forewing is gray with wavy black lines.

41. *Melanolophia imitata*

Wingspan 3.7 cm. Forewing is a dull mottled brown with narrow wavy lines and small black marginal spots. This geometrid is common and widely distributed in western North America. Moths fly in early spring. Caterpillars feed on the foliage of species of Pinaceae, particularly Douglas-fir (*Pseudotsuga menziesii*).

Similar species: ***Hesperumia latipennis*** **(34)** wings with more gray, moths fly in midsummer; ***Neoalcis californiaria*** **(35)** forewing with more sharply defined wavy lines and lacking the submarginal spots, moths fly in late summer to fall; ***Protoboarmia porcelaria*** **(40)** is smaller, moths fly in midsummer.

42. *Biston betularia*

Wingspan 4.8 cm. The wings are variable in color from pale gray to a dark black brown with wavy black lines and heavily speckled with dark gray spots. This species is the salt and pepper moth that has been cited as an example of industrial melanism in England. This geometrid is common and widely distributed in forests and woodlands of western North America. Moths fly in early to mid summer. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs, particularly alder (*Alnus*), willow (*Salix*), and chinquapin (*Chrysolepis chrysophylla*).

Similar species: species of ***Cochisea*** **(43, 44)** lack the heavy speckling on the wings and fly in fall; species of ***Lycia*** (Geometridae) also lack the heavy speckling and fly in late winter or early spring.

43. *Cochisea sonomensis*

Wingspan 4.1 cm. The wings are dark gray with broad wavy black lines. This geometrid is limited in its occurrence to the Pacific West from southwestern Oregon to central California. Moths fly in fall. Caterpillars feed on the foliage of pine (*Pinus*).

Similar species: ***Cochisea sinuaria*** **(44)** wings are pale gray with narrow black lines. ***Biston betularia*** **(42)** and species of ***Lycia*** (Geometridae) are similar in appearance but fly at different times of the year.

44. *Cochisea sinuaria*

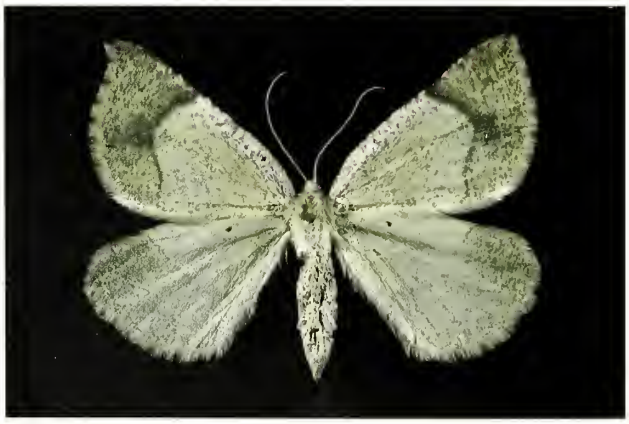
Wingspan 5.0 cm. The wings are pale gray with narrow wavy black lines. This geometrid occurs from western Oregon to Arizona. Moths fly in fall. Caterpillars feed on the foliage of manzanita (*Arctostaphylos*).

Similar species: ***Cochisea sonomensis*** **(43)** wings are dark gray with broad black lines; ***Biston betularia*** **(42)** and species of ***Lycia*** (Geometridae) are similar in appearance but fly at different times of the year.

45. *Erannis tiliaria*

Females are wingless. Male wingspan 4.0 cm. The wings are cream colored to pale yellow with fine speckles and dark wavy bands, the outer bands varying from solid black to pale brown. This geometrid is common and widely distributed in western North America. Moths fly in late fall. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs, notably maple (*Acer*), alder (*Alnus*), cherry (*Prunus*), oak (*Quercus*), rose (*Rosa*), and willow (*Salix*).

Similar species: ***Phigalia plumogeraria*** forewings and hindwings are pale gray with thin black lines, moths fly in early spring.



46. *Sericosema juturnaria*

Wingspan 3.5 cm. Forewing is pale tan with a curved black postmedian line and a variable black submarginal border. This geometrid is abundant and widely distributed in dry woodlands in western North America. Moths fly in midsummer. Caterpillars feed only on the foliage of species of *Ceanothus*.

47. *Drepanulatrix unicalcararia*

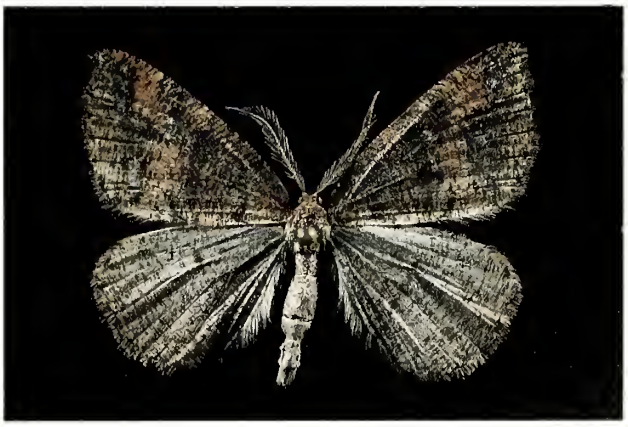
Wingspan 4.0 cm. Forewing is gray to red-orange with a narrow, sharply angled postmedian line. This geometrid is widely distributed in western North America. Moths fly in two distinct periods: late spring to early summer and late summer to fall. Caterpillars of all species of ***Drepanulatrix*** **(47-50)** feed only on the foliage of species of *Ceanothus*.

48. *Drepanulatrix quadraria*

Wingspan 3.0 cm. Forewing is gray with dark, sharply angled and dentate postmedian line. This geometrid is common and widely distributed in western North America. Moths fly during early to midsummer. Caterpillars of all species of ***Drepanulatrix*** **(47-50)** feed only on the foliage of species of *Ceanothus*.

Similar species: ***Drepanulatrix secundaria*** is widely distributed in western North America, wings are pale yellow-brown to red-orange, forewing with a postmedian line of large dark blotches; ***Drepanulatrix monicaria*** is limited to the Pacific West, wings are gray to red-orange with a postmedian line of small dark spots; ***Drepanulatrix unicalcararia*** **(47)** forewing with a sharply angled postmedian line which is not dentate.

49. *Drepanulatrix foeminaria*



Wingspan 3.1 cm. The wings are brown, speckled with black, and show amorphous grey-black markings. This geometrid is common and widely distributed in western North America. Moths fly in spring. Caterpillars of all species of ***Drepanulatrix*** **(47-50)** feed only on the foliage of species of *Ceanothus*.

Similar species: ***Drepanulatrix hulstii*** is larger, hindwing pale gray-brown, moths fly in midsummer; ***Apodrepanulatrix litaria*** (Geometridae) is larger, hindwing dark gray brown, moths fly in fall.

50. *Drepanulatrix carnearia*

Wingspan 2.5 cm. The wings vary from cream-white to pink or orange; forewing with three narrow, straight red lines. This geometrid is common and widely distributed in the Pacific Northwest. Moths fly in early summer. Caterpillars of all species of ***Drepanulatrix* (47-50)** feed only on the foliage of species of *Ceanothus*.

Similar species: ***Eudrepanulatrix rectifascia*** (Geometridae) forewing with one straight line, common and widely distributed, moths fly in midsummer, caterpillars feed only on the foliage of species of *Ceanothus*; ***Drepanulatrix bifilata*** forewing with two straight lines, common and widely distributed in the Southwest to southwestern Oregon; ***Drepanulatrix falcataria*** forewing falcate with three wavy lines, moths fly in spring, common and widely distributed.

51. *Euchlaena tigrinaria*

Wingspan 3.9 cm. The wings are pale orange and speckled with many dark spots. This geometrid is common and widely distributed in western North America. Moths fly in midsummer. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs, such as serviceberry (*Amelanchier alnifolia*), red-stem osier (*Cornus stolonifera*), hazelnut (*Corylus cornuta*), and willow (*Salix*).

Similar species: ***Euchlaena madusaria*** wings lack the dark spots, forewing with a bicolored yellow-black patch at the apex, most common east of the Cascade Mountains; ***Euchlaena johnsonaria*** also lacks the dark spots, has scallopped wing margins, and varies from pale yellow to brown.

52. *Pero mizon*

Wingspan 4.1 cm. Forewing is pale red-brown with a darker median area, wing edge dentate. This geometrid is common and widely distributed in wet conifer forests of the Pacific Northwest, especially abundant west of the Cascades. Moths fly in mid to late summer. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs, such as maple (*Acer*), madrone (*Arbutus menziesii*), snowberry (*Symphoricarpos albus*), ocean spray (*Holodiscus discolor*), and oak (*Quercus*) and conifers, such as Douglas-fir (*Pseudotsuga menziesii*) and western hemlock (*Tsuga heterophylla*).

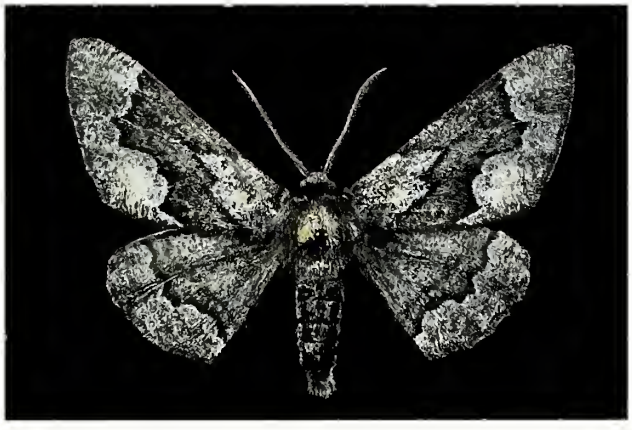
Similar species: Populations in the southern Rocky Mountains are considered to be a separate species, ***Pero giganteus***.

53. *Pero occidentalis*

Wingspan 3.4 cm. Forewing is dark gray-brown with a red-black median band, wing edge dentate; males have slightly dentate antennae with minute antennal branches (photo is of a male). This geometrid is abundant and widely distributed in western North America. Moths fly in late spring. Caterpillars feed on the foliage of conifers, particularly Pinaceae.

Similar species: ***Pero behrensaria*** is almost identical in coloration, distribution, and food plants to ***P. occidentalis***, but with the males having filiform antennae; ***Pero morrisonaria*** with wings more mottled and yellow colors in the postmedian area of the forewing, widely distributed in wet conifer forests of the Pacific Northwest, caterpillars feed on the foliage of species of Pinaceae.

54. *Nacophora mexicanaria*



Wingspan 5.3 cm. This is one of the largest geometrids in the Pacific Northwest. Forewing is a pale mottled brown and yellow with a jagged darker brown median band. This species is common and widely distributed in western North America. Moths fly in midsummer. Caterpillars feed on the foliage of pine (*Pinus*).

55. *Aethaloida packardaria*

Wingspan 3.5 cm. The wings are dark gray with fine black wavy lines. This geometrid is common in California and southwestern Oregon. Typically, two flight periods are observed, the first flight occurs from March to June and the second occurs in August and September. Caterpillars feed on snowberry (*Ceanothus velutinus*) and deerbrush (*Ceanothus integerrimus*).

Similar species: numerous species exhibit similar shades of gray, brown, and white colors with fine wavy black lines, such as ***Anavitrinella pampinaria*** **(38)** and ***Iridopsis emasculata*** **(37)**, however, ***A. packardaria*** is distinguished by its relatively small size and general dark gray color.

56. *Gabriola dyari*

Wingspan 2.8 cm. Forewing is a dark mottled gray to black with a narrow wavy black median line and a curved black basal line. This geometrid is common and widely distributed in western North America. Moths fly in midsummer. Caterpillars feed on the foliage of conifers, particularly grand fir (*Abies grandis*), Douglas-fir (*Pseudotsuga menziesii*), and western hemlock (*Tsuga heterophylla*).

57. *Campaea perlata*

Wingspan 3.9 cm. Forewing is a pale green-white with two white lines. This geometrid is common and widely distributed in western North America. Moths fly in summer. Caterpillars are generalist feeders on foliage of flowering trees and shrubs, particularly, alder (*Alnus*), maple (*Acer*), cherry (*Prunus*), oak (*Quercus*), and willow (*Salix*).

Similar species: ***Cabera erythemaria*** (Geometridae) has three faint brown lines; ***Protitame matilda*** (Geometridae) forewing with a narrow black postmedian line. Both species are smaller than ***C. perlata***, have white wings, widely distributed, caterpillars feed on foliage of willow (*Salix*).

58. *Ennomos magnaria*

Wingspan 5.2 cm. Forewing is yellow-orange with many small dark spots and a sharply angular outer margin. This geometrid is common and widely distributed in western North America but is more common west of the Cascade Mountains. Moths fly in fall. Caterpillars feed on the foliage of alder (*Alnus*) and willow (*Salix*).

59. *Thallophaga taylorata*

Wingspan 3.3 cm. Forewing is slightly falcate, lightly speckled brown with a dark brown median band and postmedian line, or separate small postmedian spots. This geometrid is abundant in wet conifer forests in the Pacific West. Moths fly in the early spring. Caterpillars feed on the fronds of ferns, particularly sword fern (*Polystichum munitum*).

60. *Selenia alciphearia*

Wingspan 4.2 cm. Forewing is strongly falcate, mottled pale yellow to brown, with three narrow, black lines and an apical orange patch. This geometrid is widely distributed in wet forests in western North America. Moths fly from early spring to midsummer. Caterpillars feed on the foliage of maple (*Acer*), alder (*Alnus*), and birch (*Betula*).

Similar species: ***Besma quercivoraria* (65)** is smaller, forewing without an orange apical patch, caterpillars feed on foliage of oak (*Quercus*).

61. *Anagoga occiduaria*

Wingspan 2.8 cm. Forewing is pale yellow to brown with a jagged dark brown median band. This geometrid is common and widely distributed in wet conifer forests of western North America. Moths fly in early summer. Caterpillars feed on the foliage of flowering trees and shrubs, particularly maple (*Acer*), blueberry (*Vaccinium*), and ocean spray (*Holodiscus discolor*).

62. *Probole amicaria*

Wingspan 3.5 cm. Forewing is falcate, pale mottled brown with a darker brown submarginal area, the subapical part of the median line extends to the wing margin in an abrupt, concave curve. This geometrid is common and widely distributed in wet conifer forests of the Pacific Northwest. Moths fly in late spring to early summer. Caterpillars are generalist feeders on the foliage of dogwood (*Cornus*) and huckleberry (*Vaccinium*).

Similar species: ***Probole alienaria*** is almost identical in distribution, host plants, and coloration, but the subapical part of the median line extends to the wing margin in a straight line.

63. *Caripeta divisata*

Wingspan 3.5 cm. Forewing has two jagged median lines, a large white discal spot, and a brown to black median area between the lines. This geometrid is particularly common west of the Cascade Mountains but widely distributed in western North America. Moths fly in midsummer. Caterpillars feed on foliage of species of Pinaceae, primarily Douglas-fir (*Pseudotsuga menziesii*) and western hemlock (*Tsuga heterophylla*).

64. *Caripeta aequaliaria*

Wingspan 3.9 cm. Forewing is a pale red-brown with two jagged median lines, a small pale discal spot, and prominent orange dashes in the submarginal area of the wings. This geometrid is common and widely distributed in western North America. Moths fly in midsummer. Caterpillars feed on the foliage of conifers, especially Douglas-fir (*Pseudotsuga menziesii*) in its western range and pines (*Pinus*) east of the Cascade Mountains.

65. *Besma quercivoraria*

Wingspan 3.3 cm. Forewing is pale brown with a sharp, angular outer margin and three nearly straight dark lines. This geometrid is common west of the Cascade Mountains, principally in oak woodlands. Moths fly in midsummer. Caterpillars feed on foliage of oak (*Quercus*).

Similar species: ***Selenia alciphearia*** **(60)** is larger, forewing with an orange apical patch.

66. *Lambdina fiscellaria*

Wingspan 3.7 cm. Forewing is slightly falcate, gray to yellow-tan with narrow black postmedian and basal lines edged with orange and a small black discal spot. This geometrid is common and widely distributed in western North America. Moths fly in fall. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs, in particular oak (*Quercus*).

Similar species: ***Metarranthis duaria*** (Geometridae) has purple-brown wings and flies in early spring, most common in the Pacific West.

67. *Nepytia umbrosaria*

Wingspan 3.6 cm. Forewing is mostly gray with jagged median and basal lines and a small black discal spot. This geometrid is common and widely distributed in western North America. Moths fly in mid to late summer. Caterpillars feed on the foliage of conifers, generally species of Pinaceae and most on Douglas-fir (*Pseudotsuga menziesii*).

Similar species: ***Nepytia swetti*** is smaller and occurs in the southern Rocky Mountain region.

68. *Nepytia phantasmaria*

Wingspan 3.3 cm. Forewing is white with jagged black basal and postmedian bands and a black discal spot. This geometrid is common and widely distributed in western North America. Moths fly in fall. Caterpillars feed on the foliage of conifers, generally species of Pinaceae and commonly on Douglas-fir (*Pseudotsuga menziesii*).

Similar species: ***Nepytia canosaria*** occurs in the Rocky Mountain region.

69. *Sicya crocearia*

Wingspan 3.4 cm. Forewing is slightly falcate, yellow with narrow basal and median lines, pink-red in the postmedian areas. This geometrid is common and widely distributed in wet conifer forests of western North America. Moths fly in midsummer. Caterpillars feed on the foliage of red alder (*Alnus rubra*).

Similar species: ***Sicya morsicaria*** forewing is pale red-brown, speckled with black, hindwing is white, occurs in the Pacific West and through the southern Rocky Mountains, caterpillars feed on broad-leaf mistletoe (*Phoradendron*).

70. *Synaxis jubararia*

Wingspan 4.0 cm. Forewing is strongly falcate, pale yellow to orange, with narrow basal and median lines. This geometrid is widely distributed in wet conifer forests of western North America. Moths fly in fall. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs, such as maple (*Acer*), alder (*Alnus*), chinquapin (*Chrysolepis chrysophylla*), snowberry (*Ceanothus velutinus*), salal (*Gaultheria shallon*), ocean spray (*Holodiscus discolor*), azalea (*Rhododendron*), elderberry (*Sambucus*), and snowberry (*Symphoricarpos albus*).

Similar species: ***Synaxis fuscata*** is smaller and paler in color, occurs in pine forests and juniper woodlands east of the Cascades, moths fly in fall; ***Synaxis pallulata*** has broad black basal and median lines, is widely distributed, flies in fall, and the caterpillars feed on the foliage of species of Pinaceae.

71. *Synaxis cervinaria*

Wingspan 4.3 cm. Forewing is strongly falcate, red-brown to gray with narrow basal and median lines. This geometrid is common and widely distributed in western North America. Moths fly in spring to mid summer. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs, such as alder (*Alnus*), madrone (*Arbutus menziesii*), manzanita (*Arctostaphylos*), bitterbrush (*Purshia tridentata*), and willow (*Salix*).

Similar species: Moths of other ***Synaxis*** species fly in fall; ***Prochoerodes forficaria*** (Geometridae) forewing is mottled gray with the median line abruptly curved at the wing apex, widely distributed, caterpillars are generalist feeders on the foliage of flowering trees and shrubs.

72. *Sabulodes aegrotata*

Wingspan 4.4 cm. Forewing is slightly falcate, pale yellow to darker brown with converging, dentate median and postmedian lines. This geometrid is abundant in wet coastal forests. Moths fly throughout the year. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs such as alder (*Alnus*), ocean spray (*Holodiscus discolor*), salmonberry (*Rubus spectabilis*), willow (*Salix*), and myrtle (*Umbellularia californica*).

73. *Sabulodes edwardsata*

Wingspan 4.1 cm. Forewing is pale yellow-brown, with a wavy, darker brown median band. This geometrid is widely distributed in the Pacific West and in the northern Rocky Mountains. Moths fly in mid to late summer. Caterpillars feed on the foliage of species of Pinaceae, particularly Douglas-fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), sitka spruce (*Picea sitchensis*), and pine (*Pinus*).

74. *Enypia packardata*

Wingspan 3.4 cm. Forewing is pale and speckled gray with jagged dentate black postmedian and basal lines. This geometrid is often abundant west of the Cascade Mountains but otherwise common and widely distributed in western North America. Moths fly in midsummer. Caterpillars feed on the foliage of species of Pinaceae, particularly grand fir (*Abies grandis*), Douglas-fir (*Pseudotsuga menziesii*), and western hemlock (*Tsuga heterophylla*).

Similar species: ***Enypia venata*** is larger and darker in color, often with a black median area; ***Epirranthis substriataria*** (Geometridae) forewing with large round discal spots and is usually uncommon, moths fly in spring; ***Philedia punctomacularia*** (Geometridae) forewing with small black dashes instead of lines, moths fly in fall.

75. *Nematocampa resistaria*

Wingspan 2.5 cm. Forewing is falcate, pale cream to deep yellow with broad purple-brown borders and narrow wavy lines. This geometrid is common and widely distributed in western North America. Moths fly in late summer. Caterpillars feed on the foliage of flowering trees, shrubs, and herbaceous plants such as maple (*Acer*), alder (*Alnus*), snowberry (*Symphoricarpos albus*), oak (*Quercus*), and mint (*Mentha*).

76. *Chlorosea banksaria*

Wingspan 3.4 cm. The wings are green with a single white line. This geometrid is widely distributed in western North America. Moths fly in midsummer. Caterpillars feed on the foliage of flowering trees and shrubs such as ocean spray (*Holodiscus discolor*) and bitterbrush (*Purshia tridentata*).

Similar species: a Rocky Mountain population of a similarly appearing species has been treated as ***Chlorosea nevadensis***; ***C. banksaria*** may be distinguished from other green geometers by their large size and the single white line.

77. *Nemoria darwiniata*

Wingspan 2.9 cm. Wings are green with narrow, curved, white basal and median lines. This geometrid is common and widely distributed in western North America. Moths fly in midsummer. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs, such as manzanita (*Arctostaphylos*), bitterbrush (*Purshia tridentata*), snowbrush (*Ceanothus velutinus*), and oak (*Quercus*).

Similar species: ***Nemoria pulcherrima*** forewing is a mottled green with red-pink margins, caterpillars feed on foliage of oak (*Quercus*) in the Pacific West; ***Chlorosea banksaria*** **(76)** is larger, forewing with a single white median line; ***Dichorda illustraria*** (Geometridae) forewing with straight white median and basal lines, caterpillars feed on sumac (*Rhus*) in the Pacific West; ***Synchlora aerata*** (Geometridae) is smaller, forewing with a jagged white median line, caterpillars feed on foliage of herbs and shrubs.

78. *Cyclophora dataria*

Wingspan 2.4 cm. The wings are yellow to pale brown with fine black speckles and a small round white spot near the discal cell. This geometrid is abundant in oak woodlands west of the Cascade Mountains. Moths fly in summer. Caterpillars feed on foliage of oak (*Quercus*).

Similar species: ***Cyclophora pendulinaria*** wings are pale gray, caterpillars feed on flowering trees and shrubs; species of ***Scopula*** (Geometridae) lack the small round discal spot on the forewing, caterpillars feed on herbaceous plants.

79. *Dysstroma citrata*

Wingspan 3.2 cm. Forewing with a black median band, a dark brown basal band, and a yellow apical patch. This geometrid is common and widely distributed in western North America. Moths fly in midsummer to fall. Caterpillars feed on the foliage of flowering trees and shrubs such as alder (*Alnus*) and thimbleberry (*Rubus parviflorus*).

80. *Dysstroma sobria*

Wingspan 3.8 cm. Forewing with a white median band and dark brown basal and postmedian bands. This species is less common than most other ***Dysstroma*** and is limited to forests of the Pacific West. Moths fly in midsummer. Caterpillars feed on foliage of salal (*Gaultheria shallon*) and rhododendron (*Rhododendron macrophyllum*).

Similar species: ***Dysstroma ochrofuscaria*** **(81)** forewing with a large yellow-orange apical patch, caterpillars feed on foliage of hazelnut (*Corylus cornuta*); ***Dysstroma truncata*** is smaller, forewing with reddish basal and postmedian bands, widely distributed in western North America, caterpillars are generalist feeders on foliage of flowering trees and shrubs.

81. *Dysstroma ochrofuscaria*

Wingspan 3.6 cm. Forewing with a white median band and a large yellow-orange apical patch. This species is less common than most other ***Dysstroma*** and is limited to wet conifer forests in the Pacific West. Moths fly in midsummer. Caterpillars have been found feeding on foliage of hazelnut (*Corylus cornuta*).

Similar species: ***Dysstroma sobria*** **(80)** and ***Dysstroma truncata*** both lack the orange apical patch on the forewing.

82. *Dysstroma formosa*

Wingspan 3.1 cm. Forewing with a gray median band and a dark brown basal band. Moths are abundant east of the Cascade Mountains, widely distributed in western North America. Moths fly in midsummer. Caterpillars feed on the foliage of currant and gooseberry (*Ribes*).

Similar species: ***Dysstroma mancipata*** occurs in forested habitats west of the Cascade Mountains; ***Dysstroma walkerata*** occurs in subalpine forests in the Cascade Mountains.

83. *Dysstroma brunneata*

Wingspan 3.0 cm. Forewing with a black median band and a white basal band. This geometrid is common and widely distributed in western North America. Moths fly in midsummer. Caterpillars feed on the foliage of currant and gooseberry (*Ribes*).

Similar species: ***Dysstroma hersiliata*** forewing with an orange basal band; ***Dysstroma formosa*** forewing with a pale gray median band and a gray or brown basal band.

84. *Eulithis propulsata*

Wingspan 3.5 cm. Forewing is slightly falcate and yellow with a brownish median band. This geometrid is common and widely distributed in western North America. Moths fly in midsummer. Caterpillars feed on the foliage of poplar (*Populus*), currant (*Ribes*), and willow (*Salix*).

85. *Eulithis xylina*

Wingspan 3.4 cm. Forewing has a dark brown median band with a smooth outer margin. This geometrid is common and widely distributed in western North America. Moths fly in midsummer. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs, particularly alder (*Alnus*), cottonwood (*Populus*), azalea (*Rhododendron*), rose (*Rosa*), willow (*Salix*), and huckleberry (*Vaccinium*).

Similar species: ***Eulithis destinata*** forewing is gray; ***Eulithis harveyata*** forewing with a black median band and a yellow postmedian area; both species of ***Eulithis*** feed on huckleberry (*Vaccinium*); ***Eustroma semiatrata*** **(86)** forewing with a black median band that has a jagged outer margin; ***Ecliptopera silaceata*** **(87)** is smaller, forewing with a smooth rounded outer margin to the median band.

86. *Eustroma semiatrata*

Wingspan 3.3 cm. Forewing with a black median band that has a jagged outer margin. This geometrid is common and widely distributed in western North America. Moths fly from spring to fall. Caterpillars feed on the foliage of herbaceous plants such as fireweed (*Epilobium*).

Similar species: ***Eustroma fasciata*** wings are paler in color, typically occurs at the higher elevations in the Cascade Mountains, caterpillars feed on fireweed (*Epilobium*) and huckleberry (*Vaccinium*), moths fly in midsummer; ***Ecliptopera silaceata*** **(87)** and ***Eulithis xylina*** **(85)** forewing with a smooth rounded outer margin to the median band.

87. *Ecliptopera silaceata*

Wingspan 2.8 cm. Forewing with a black median band that has a smooth rounded outer margin, postmedian line has sharp dentate spots. This geometrid is common and widely distributed in western North America. Moths fly in midsummer. Caterpillars feed on the foliage of herbaceous plants, especially fireweed (*Epilobium*).

Similar species: species of ***Eustroma***, such as ***Eustroma semiatrata*** **(86)**, have a jagged outer margin on the median band; species of ***Eulithis***, such as ***Eulithis propulsata*** **(84)** and ***Eulithis xylina*** **(85)**, are larger.

88. *Hydriomena marinata*

Wingspan 3.2 cm. Forewing is a dull gray-brown with a central median band of pale gray. This geometrid is common and widely distributed in western North America. Moths fly in spring. Caterpillars feed on the foliage of species of Pinaceae such as spruce (*Picea*), Douglas-fir (*Pseudotsuga menziesii*), and western hemlock (*Tsuga heterophylla*).

Similar species: at least 40 species of similar appearing ***Hydriomena*** occur in western North America. The most common include ***Hydriomena renunciata*** with a pale green forewing and caterpillars that feed on the foliage of alder (*Alnus*); ***Hydriomena perfracta*** forewing is pink-gray, caterpillars feed on the foliage of blueberry (*Vaccinium*); ***Hydriomena irata*** is smaller, forewing with a white median band, caterpillars feed on foliage of oak (*Quercus*); ***Hydriomena edenata*** forewing with a large black dash along the inner margin.

89. *Hydriomena speciosata*

Wingspan 3.6 cm. Forewing with alternating bands of green and black. This geometrid is common in wet conifer forests of western North America. Moths fly in midsummer. Caterpillars feed on the foliage of species of Pinaceae such as grand fir (*Abies grandis*), spruce (*Picea*), pine (*Pinus*), Douglas-fir (*Pseudotsuga menziesii*), and western hemlock (*Tsuga heterophylla*).

Similar species: ***Hydriomena furcata*** forewing with alternating bands of red-brown and black but the basic wing color is a red-brown, common and widely distributed in western North America, moths fly in late summer, caterpillars feed on foliage of willow (*Salix*).

90. *Hydriomena nubilofasciata*

Wingspan 2.8 cm. Forewing with straight bands along the submarginal and postmedian areas, the postmedian and basal bands are gray-black. This geometrid is common west of the Cascade Mountains. Moths fly in early spring. Caterpillars feed on the foliage of oak (*Quercus*).

91. *Hydriomena manzanita*

Wingspan 3.2 cm. Forewing is elongate and pale gray with obscure markings forming dark curved bands. This geometrid is common, particularly west of the Cascade Mountains in dry conifer forests. Moths fly in early spring. Caterpillars feed on the foliage of manzanita (*Arctostaphylos*).

Similar species: ***Eupithecia misturata*** **(103)** is smaller, forewing with a small black discal spot.

92. *Triphosa haesitata*

Wingspan 3.9 cm. Forewing is variable red-brown with darker and lighter wavy bands; the hindwing margin strongly dentate. This geometrid is common and widely distributed in wet conifer forests of western North America. Moths fly from late summer to spring, overwintering as adults. Caterpillars feed on the foliage of buckthorn (*Rhamnus purshiana*).

Similar species: ***Triphosa californiata*** is smaller, forewing is dark black-gray, widely distributed in western North America, caterpillars feed on coffeeberry (*Rhamnus occidentalis*); ***Hydria undulata*** (Geometridae) is smaller, forewing is densely covered with undulating pale lines, widely distributed, caterpillars are generalist feeders on the foliage of flowering trees and shrubs; ***Coryphista meadii*** (Geometridae) forewing with straight bands, widely distributed, caterpillars feed on berberis (*Berberis*).

93. *Rheumaptera subhastata*

Wingspan 3.1 cm. Forewing is white with black borders and mottled black basal and median areas. This geometrid is widely distributed in western North America. Moths fly during the day in late spring to midsummer. Caterpillars feed on the foliage of alder (*Alnus*) where they fold a leaf into a tent.

Similar species: ***Rheumaptera hastata*** forewing mostly black with a white postmedian band, uncommon but widely distributed; ***Epirrhoe sperryi*** (Geometridae) is smaller, occurs in the Rocky Mountain region.

94. *Mesoleuca gratulata*

Wingspan 2.4 cm. Forewing is mostly black with a curved white median band and a black discal spot. This geometrid is common and widely distributed in western North America. Moths fly during the day in early spring. Caterpillars feed on the foliage of hazelnut (*Corylus cornuta*).

Similar species: ***Mesoleuca ruficillata*** is larger, forewing with the white median band relatively straight, uncommon but widely distributed in North America, moths fly in midsummer, caterpillars feed on the foliage of birch (*Betula*).

95. *Perizoma grandis*

Wingspan 2.4 cm. Forewing with alternating dark and pale red-brown bands and a black subapical patch. This geometrid is common in the wet conifer forests of the Pacific Coast. Moths fly in midsummer. The caterpillar host plant is unknown.

Similar species: ***Perizoma curvilinea*** forewing is pale gray with alternating fine black lines and bands, caterpillars feed on foliage of ocean spray (*Holodiscus discolor*); ***Perizoma costiguttata*** forewing is pale gray with broad black costal bars, caterpillars feed on foliage of ocean spray; ***Anticlea vasiliata*** (Geometridae) is larger, forewing red-brown with variable white and black bands, moths are very common and fly in early spring, caterpillars feed on foliage of rose (*Rosa*) and thimbleberry (*Rubus parviflorus*).

96. *Marmopteryx marmorata*

Wingspan 3.6 cm. Forewing is pale gray-brown with a curved white band (top photo); ventral surface of the hindwing is reddish-orange with a white median band and discal spots (bottom photo). This geometrid is common and widely distributed in dry forests and woodlands of western North America. Moths fly in midsummer. Caterpillar host plants are unknown.

Similar species: at least twelve species in the geometrid genera ***Marmopteryx***, ***Stamnodes***, and ***Stamnoctenis*** with the ventral surface of the hindwing brightly colored, moths occur in dry forests and woodlands of western North America, however, ***M. marmorata*** is distinguished by patterns in the markings on the underside of the hindwing.

97. *Xanthorhoe defensaria*

Wingspan 2.5 cm. Forewing is gray to yellow with a wavy black median band. This geometrid is very common and widely distributed in western North America. Moths fly in spring and again in fall. Caterpillars feed on the foliage of herbaceous plants.

Similar species: ***Xanthorhoe defensaria*** represents a large group of very similar moths with wavy black to gray median bands and have caterpillars that feed on the foliage of herbs. These include seven species of ***Xanthorhoe***; three species of ***Epirrhoe*** (Geometridae) that have broad, black submarginal borders; ***Orthonama centrostrigaria*** **(98)** forewing with an interrupted median band; ***Euphyia unangulata*** (Geometridae) forewing with a broad, black subapical patch; ***Zenophleps lignicolorata*** (Geometridae) forewing with the median band mostly pale brown to gray.

98. *Orthonama centrostrigaria*

Wingspan 2.3 cm. Forewing is pale brown with a dark brown median band, median band is abruptly interrupted by a pale area near the discal spot, discal spot is small and black. This geometrid is very common in the Pacific West. Moths fly throughout the year. Caterpillars feed on the foliage of herbaceous plants.

Similar species: ***Orthonama obstipata*** is dimorphic with solid dark red-brown forewing or the forewing is pale yellow with dark bands, is uncommon but widely distributed in western North America; in species of ***Xanthorhoe*** (Geometridae) the median band is not interrupted.

99. *Venusia pearsalli*

Wingspan 2.1 cm. Forewing is pale gray with rows of narrow black lines. This geometrid is abundant and widely distributed in wet conifer forests of western North America. Moths fly in spring. Caterpillars feed on the foliage of alder (*Alnus*), chinquapin (*Chrysolepis chrysophylla*), and oak (*Quercus*).

Similar species: ***Venusia duodecemlineata*** is smaller, forewing is dark gray, widely distributed, moths fly in spring; ***Venusia cambrica*** is larger, wing mostly white, occurs in wet conifer forests in the Pacific West, moths fly from mid to late summer; species of ***Operophtera*** **(101, 102)** and ***Epirrita*** **(100)** are larger with a more elongate forewing, moths fly in fall and winter; ***Perizoma curvilinea*** forewing elongate with thicker black lines, moths fly in midsummer; ***Spargania magnoliata*** (Geometridae) hindwing pink, widely distributed, caterpillars feed on fireweed (*Epilobium*).

100. *Epirrita autumnata*

Wingspan 3.6 cm. The wings are gray-white with wavy dark lines. This geometrid is common and widely distributed in western North America. Moths fly in fall. Caterpillars are generalist feeders on the foliage of conifers and flowering trees and shrubs such as Douglas-fir (*Pseudotsuga menziesii*), true fir (*Abies*), larch (*Larix*), pine (*Pinus*), alder (*Alnus*), birch (*Betula*), and poplar (*Populus*).

Similar species: species of ***Venusia***, such as ***Venusia pearsalli*** **(99)**, are smaller and fly in spring and summer; ***Operophtera danbyi*** **(102)**, forewing is dark gray with straighter dark lines, moths fly in the late fall.

101. *Operophtera bruceata*

Females are wingless. The male wingspan is 2.9 cm. Forewing is solid dark gray to pale cream with fine dark lines. This geometrid is common and widely distributed in western North America. Moths fly in late fall and winter. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs, such as maple (*Acer*), oak (*Quercus*), cherry (*Prunus*), and rose (*Rosa*).

Similar species: ***Operophtera danbyi*** **(102)** is larger, wings more elongate; species of ***Venusia***, such as ***Venusia pearsalli*** **(99)**, are smaller and fly in spring and late summer.

102. *Operophtera danbyi*

Females are wingless. The male wingspan is 3.4 cm. Forewing is elongate and gray with dark lines. This geometrid is common and distributed throughout the Pacific West. Moths fly in late fall and winter. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs, particularly ash (*Fraxinus*), cherry (*Prunus*), and oak (*Quercus*).

Similar species: ***Operophtera bruceata*** **(101)** is smaller with less elongate wings; ***Epirrita autumnata*** **(100)** wings are gray-white with wavy dark lines; species of ***Venusia***, such as ***Venusia pearsalli*** **(99)** are smaller and fly in spring and summer.

103. *Eupithecia misturata*

Wingspan 1.8 cm. Forewing is pale gray with a small black discal spot. This geometrid is very common and widely distributed in western North America. Moths fly in summer. Caterpillars are generalist feeders on the foliage and flowers of flowering trees and shrubs, particularly ocean spray (*Holodiscus discolor)*, manzanita (*Arctostaphylos*), snowbrush (*Ceanothus velutinus*), and oak (*Quercus*).

Similar species: more than 120 species of ***Eupithecia*** occur in North America and are very difficult to identify. Typically genitalia must be observed for distinguishing the species. Also, adults reared from field-collected caterpillars with knowledge of host plants can be helpful for accurate identifications; among the species of ***Eupithecia***, ***E. misturata*** is one of the smallest and is the most common species reared from caterpillars on flowers. ***Clemensia albata*** (2) has different wing markings.

104. *Eupithecia subcolorata*

Wingspan 2.2 cm. Forewing is pale gray with dark gray markings and a black discal spot. This geometrid is common and widely distributed in western North America. Moths fly in late spring and early summer. Caterpillars feed on the foliage of species of *Vaccinium*.

Similar species: more than 120 species of ***Eupithecia*** occur in North America and are very difficult to identify. Typically genitalia must be observed for distinguishing the species. Also, adults reared from field-collected caterpillars with knowledge of host plants can be helpful for accurate identifications; among the species of ***Eupithecia***, ***E. subcolorata*** is the most common species reared from foliage of species of *Vaccinium*.

105. *Eupithecia graefii*

Wingspan 2.3 cm. Forewing is brown with a red-yellow cast and a long narrow black discal spot. This geometrid is common and widely distributed in western North America. Moths fly in summer. Caterpillars feed on the foliage of manzanita (*Arctostaphylos*) and madrone (*Arbutus menziesii*).

Similar species: more than 120 species of ***Eupithecia*** occur in North America and are very difficult to identify. Typically genitalia must be observed for distinguishing the species. Also, adults reared from field-collected caterpillars with knowledge of host plants can be helpful for accurate identifications; among the species of ***Eupithecia***, ***E. graefii*** is the most common species reared from foliage of manzanita and madrone.

106. *Eupithecia ravocostaliata*

Wingspan 2.3 cm. Forewing is elongate and pointed with white and black costal and submarginal patches. This geometrid is very common in the Pacific West. Moths fly in early spring. Caterpillars feed on the foliage of buckthorn (*Rhamnus purshiana*).

Similar species: more than 120 species of ***Eupithecia*** occur in North America and are very difficult to identify. Typically genitalia must be observed for distinguishing the species. Also, adults reared from field-collected caterpillars with knowledge of host plants can be helpful for accurate identifications; among the species of ***Eupithecia***, the forewing of ***E. ravocostaliata*** is one of the more intricately patterned and is the most common species reared from the foliage of buckthorn.

NOCTUIDAE

107. *Idia americalis*

Wingspan 3.1 cm. Forewing is pale gray-white with narrow jagged black bands. This noctuid is widely distributed in western North America, common in wet conifer forests in the Pacific West. Moths fly in midsummer. Caterpillars feed on lichens and dead foliage.

Similar species: many species have this general appearance, at least eight species of ***Idia*** are still poorly known in western North America and several more are undescribed; additionally, species in twelve other genera of Noctuidae are characterized by being small brown moths, including ***Hemeroplanis***, ***Spargaloma***, ***Zanclognatha***, ***Chytolita***, and ***Bleptina***.

108. *Hypena humuli*

Wingspan 3.2 cm. Forewing is dark brown to pale cream with a black discal area; labial palps long. This noctuid is widely distributed in western North America. Moths fly throughout the year. Caterpillars feed on the foliage of nettle (*Urtica*).

Similar species: at least eight other species in the noctuid genera ***Hypena*** and ***Bomolocha*** (Noctuidae) have a similar looking narrow brown forewing, long labial palps, and are particularly common west of the Cascade Mountains.

109. *Scoliopteryx libatrix*

Wingspan 4.7 cm. Forewing is strongly falcate, scalloped, gray to pale brown with a red-orange median band and white postmedian line. This noctuid is widely distributed in western North America. Moths fly throughout the year, hibernating in winter. Caterpillars feed on the foliage of willow (*Salix*) and poplar (*Populus*).

110. *Asticta victoria*

Wingspan 4.8 cm. Forewing is pink-lavender to dark pink-gray with a narrow black reniform spot; thoracic collar black. This noctuid is widely distributed in western North America. Moths fly in midsummer. Field-based information on caterpillar host plants is unknown but we have reared this species on lupine (*Lupinus*) in the lab.

111. *Synedoida ochracea*

Wingspan 4.6 cm. Forewing is light to dark brown with a narrow black reniform spot; hindwing orange with a black median band, submarginal border, and discal spot. This noctuid is widely distributed in wet forests west of the Cascade Mountains and in riparian forests east of the Cascade Mountains. Moths fly in midsummer. Caterpillars feed on the foliage of elderberry (*Sambucus*).

Similar species: ***Synedoida edwardsii*** forewing is dark gray with a black reniform spot, hindwing with broad black bands. The following five species have a large, pale, sharply dentate reniform spot; ***Synedoida divergens*** forewing with white lines on the reniform spot and a pale yellow to white median band; ***Synedoida adumbrata*** is small, forewing with a gray reniform spot; ***Synedoida hudsonica*** forewing with a white reniform spot, hindwing white to cream, occurs in high elevation conifer forests; ***Synedoida howlandi*** hindwing is red-orange, occurs in ponderosa pine forests and juniper woodlands; ***Synedoida sabulosa*** wings are gray.

112. *Zale lunata*

Wingspan 4.8 cm. Forewing may have a varying mix of yellow, red-brown and black mottled with fine dark lines, apical part of the postmedian line is strongly dentate. This noctuid is common in wet coastal forests and in riparian forests east of the Cascades. Moths fly in spring and late summer. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs, especially willows (*Salix*).

Similar species: ***Zale minerea*** is smaller with a smoother postmedian line, common in high elevation conifer forests and wet coastal forests, caterpillars are generalist feeders on the foliage of flowering trees and shrubs; ***Zale termina*** is smaller, dark gray, occurs in dry forests in the Pacific West, caterpillars feed on chinquapin (*Chrysolepis chrysophylla*) and canyon live oak (*Quercus chrysolepis*); ***Zale duplicata*** is smaller, forewing is dark gray with a small black reniform spot and lacks fine dark lines, occurs in high elevation conifer forests of the Rocky Mountains and Cascade Mountains, caterpillars feed on the foliage of pine (*Pinus*) and larch (*Larix*).

113. *Catocala aholibah*

Wingspan 7.9 cm. Forewing is mottled black, gray, and red-brown with jagged black lines; hindwing is rosy red with a black median band narrowly constricted in the center and a broad black submarginal border. This noctuid is widely distributed in western North America. Moths fly in late summer. Caterpillars feed on the foliage of oak (*Quercus*).

Similar species: ***Catocala briseis*** is part of a species complex that contains at least 14 species in western North America with the black median band on the hindwing not narrowly constricted, these species occur in riparian habitats where their caterpillars feed on the foliage of willow (*Salix*) and poplar (*Populus*).

114. *Catocala ilia*

Wingspan 7.9 cm. Forewing is mottled black and gray with jagged black lines; hindwing is orange, the black median band and submarginal border with wavy undulations. Moths occur in dry forests in the Pacific West. Moths fly in late summer. Caterpillars feed on the foliage of oak (*Quercus*).

115. *Catocala relicta*

Wingspan 7.6 cm. Forewing may vary from white to dark gray with black bands; hindwing is black with a white median band. This noctuid is widely distributed in wet forests of western North America. Moths fly in late summer. Caterpillars feed on the foliage of willow (*Salix*) and poplar (*Populus*).

116. *Catocala verrilliana*

Wingspan 4.6 cm. Forewing is pale gray with jagged black lines; hindwing is orange-red with the black median band constricted in the center and a broad black submarginal border with red marginal patches. Moths occur in dry forests in the Pacific West. Moths fly in late summer. Caterpillars feed on the foliage of oak (*Quercus*).

117. *Catocala ophelia*

Wingspan 5.2 cm. Forewing is dark gray with relatively smooth black lines; hindwing is deep red with the black median band constricted in the center and a broad black submarginal border. This noctuid is restricted to dry forests in California and southwestern Oregon. Moths fly in late summer. Caterpillars feed on the foliage of canyon live oak (*Quercus chrysolepis*).

118. *Eosphoropteryx thyatyroides*

Wingspan 3.7 cm. Forewing is strongly angular along the anal margin, gray with pink basal and subapical patches and a small white stigma. This noctuid is widely distributed in wet forests of western North America. Moths fly in midsummer. Caterpillars feed on the foliage of herbaceous Ranunculaceae such as meadow-rue (*Thalictrum*) and columbine (*Aquilegia*).

119. *Autographa corusca*

Wingspan 4.0 cm. Forewing is mottled pink and purple-brown with a white comma-shaped stigma. This noctuid is common but endemic to wet coastal forests. Moths fly in midsummer. Caterpillars feed on the foliage of alder (*Alnus*).

Similar species: ***Autographa mappa*** forewing is mottled red-brown with thin black bands and the stigma broken into two spots, uncommon and occurs in wet forests of the Pacific Northwest and Rocky Mountains; ***Autographa metallica*** forewing is red-copper with a large slipper-shaped stigma, uncommon and endemic to the Pacific Northwest.

120. *Autographa speciosa*

Wingspan 3.8 cm. Forewing has contrasting zones of black and gray with a comma-shaped white stigma. This species was previously considered a rare moth known only from three sites extending from Vancouver Island to the central Sierra Nevada. This noctuid is now known to be widespread in old-growth forests and high mountain meadows of western Oregon. Moths fly in midsummer.

Similar species: ***Autographa v-alba*** is a rare species occurring in the Cascade Mountains and northern Rocky Mountains, stigma is v-shaped; ***Autographa californica*** forewing is mottled with gray, stigma is comma-shaped, abundant and widespread in western North America, caterpillars feed on the foliage of many herbaceous plants and can be a pest on crops such as alfalfa (*Medicago sativa*), peppermint (*Mentha piperita*), and cabbage (*Brassica oleraceae*).

121. *Syngrapha epigaea*

Wingspan 3.9 cm. Forewing is pale gray with a thin white stigma outlined in black; hindwing is gray. This noctuid is uncommon but widely distributed in montane and coastal forests. Moths fly in late summer. Caterpillars feed on the foliage of huckleberry (*Vaccinium*).

Similar species: ***Autographa ampla*** forewing with a thin white hook-shaped stigma, a broad black median band below the stigma, a small black subapical patch, widely distributed in wet conifer forests of western North America and particularly common in wet coastal forests, caterpillars are generalist feeders on the foliage of flowering trees and shrubs; ***Syngrapha orophila*** **(122)** hindwing is banded in yellow and black.

122. *Syngrapha orophila*

Wingspan 3.8 cm. Forewing is pale gray with a thin white hook-shaped stigma and a broad black median band below the stigma; hindwing is yellow with a broad black submarginal band. This noctuid is widely distributed in high elevation conifer forests of the Cascade Mountains and northern Rocky Mountains. Moths fly in midsummer. Caterpillars feed on the foliage of huckleberry (*Vaccinium*).

Similar species: several species are found in high elevation conifer forests and have a yellow-black banded hindwing; ***Syngrapha ignea*** forewing with a large curved stigma, widely distributed; ***Syngrapha sackenii*** forewing with a long, straight stigma and is endemic to the Rocky Mountains; ***Autographa sansoni*** forewing is mottled red-brown with a curved stigma, hindwing pale yellow; ***Syngrapha epigaea*** **(121)** and ***Autographa ampla*** have a gray hindwing.

123. *Syngrapha rectangula*

Wingspan 3.5 cm. Forewing is black with contrasting white basal and submarginal areas and a large white, bifurcate stigma; hindwing is pale brown with a broad black submarginal border. This noctuid is common and occurs in wet conifer forests of the Pacific Northwest and northern Rocky Mountains, and is common in wet coastal forests. Moths fly in midsummer. Caterpillars feed on the foliage of species of Pinaceae.

Similar species: ***Syngrapha alias*** forewing is mottled pink-gray with a bifurcate stigma, widespread in both Sitka spruce and high elevation Engelmann spruce forests, caterpillars feed on the foliage of conifers.

124. *Syngrapha celsa*

Wingspan 3.8 cm. Forewing is mottled gray with a large white, slipper-shaped stigma; hindwing is pale yellow-brown with a broad black submarginal border. This noctuid is common and widely distributed. Moths fly in midsummer. Caterpillars feed on the foliage of species of Pinaceae.

Similar species: ***Syngrapha viridisigma*** is larger, lacks the white stigma, uncommon and occurs in high elevation forests in western North America, caterpillars feed on the foliage of species of Pinaceae; ***Syngrapha angulidens*** has a white comma-shaped stigma, common in high elevation conifer forests of the Rocky Mountains, caterpillars feed on the foliage of Engelmann spruce (*Picea englemannii*) and subalpine fir (*Abies lasiocarpa*); ***Autographa californica*** forewing with a comma-shaped stigma and a pale gray subapical streak.

125. *Nola minna*

Wingspan 2.3 cm. Forewing is elongate, pale gray with a black basal spot and a narrow black postbasal line. This noctuid is common in wet forests in the Pacific West. Moths fly in early spring. Caterpillars feed on the foliage of species of *Ceanothus*.

Similar species: ***Meganola minuscula*** (Noctuidae) forewing with a black median spot and curving black postmedian line, occurs in dry forests in the Pacific West, caterpillars feed on oak (*Quercus*).

126. *Panthea portlandia*

Wingspan 5.0 cm. Forewing is white to dark black-gray with jagged, dentate black lines; hindwing is white with a dark submarginal band or pure gray; males with pectinate antennae. This noctuid is common and widely distributed in western North America, particularly abundant in wet coastal forests. Moths fly in summer. Caterpillars feed on the foliage of species of Pinaceae.

Similar species: populations east of the Cascade Mountains are darker gray and have been called ***Panthea virginaria***; ***Panthea gigantea*** is larger, forewing more elongate and nearly black, hindwing white, males with weakly pectinate antennae, uncommon but widely distributed in dry forests.

127. *Acronicta hesperida*

Wingspan 5.3 cm. Forewing is pale gray with reniform and orbicular discal spots strongly outlined. This noctuid is abundant and widely distributed in western North America. Moths fly in midsummer. Caterpillars feed on the foliage of alder (*Alnus*).

Similar species: the other species of ***Acronicta*** are smaller in size; ***Acronicta lepusculina*** forewing with thin black basal and subanal dashes, widely distributed in riparian forests, caterpillars feed on poplar (*Populus*) and willow (*Salix*); ***Acronicta vulpina*** forewing with discal spots reduced to small black dots and with a black basal dash, uncommon; ***Acronicta innotata*** forewing with discal spots reduced to small black dots but lacking a black basal dash, uncommon; ***Acronicta cyanescens*** forewing is gray with a black basal dash, uncommon, caterpillars feed on foliage of snowbrush (*Ceanothus velutinus*).

128. *Acronicta grisea*

Wingspan 4.0 cm. Forewing is dark gray with black basal and anal margin dashes, postmedian band with a sharply dentate margin; hindwing is white. This noctuid is common and widely distributed in western North America. Moths fly in midsummer. Caterpillars feed on the foliage of alder (*Alnus*) and willow (*Salix*).

Similar species: ***Acronicta radcliffei*** postmedian band of the forewing with a smooth margin, hindwing brown, occurs in the Pacific West.

129. *Acronicta funeralis*

Wingspan 3.4 cm. Forewing is pale gray with an irregular black band across the inner wing margin. This noctuid is common and distributed in the Pacific West. Moths fly from late spring to early summer. Caterpillars feed on the foliage of oak (*Quercus*), maple (*Acer*), and huckleberry (*Vaccinium*).

Similar species: ***Acronicta mansueta*** is smaller, forewing with a pale and broken black inner band, widely distributed in western North America.

130. *Acronicta marmorata*

Wingspan 4.3 cm. Forewing is mottled black, gray, and white with black basal and subanal dashes. This noctuid is abundant in dry forests in the Pacific West. Moths fly in spring and early summer. Caterpillars feed on the foliage of oak (*Quercus*).

131. *Acronicta impleta*

Wingspan 4.8 cm. Forewing is dark black-gray with the postmedian band outlined as small white spots. This noctuid is common and widely distributed in wet forests, particularly abundant in old-growth conifer forests west of the Cascade Mountains. Moths fly in early summer. Caterpillars feed on the foliage of alder (*Alnus*).

132. *Acronicta impressa*

Wingspan 3.8 cm. Forewing is dark mottled gray with discal spots outlined and filled with darker gray; hindwing is gray. This noctuid is common and widely distributed in western North America. Moths fly in early to midsummer. Caterpillars feed on the foliage of bitterbrush (*Purshia tridentata*) and rose (*Rosa*).

Similar species: ***Acronicta fragilis*** forewing with contrasting black and white, hindwing white, widely distributed in western North America, caterpillars feed on cherry (*Prunus*); ***Raphia frater*** (Noctuidae) forewing gray, hindwing white, widely distributed.

133. *Acronicta perdita*

Wingspan 4.4 cm. Forewing is gray and heavily suffused with black; male hindwing white, female hindwing gray. This noctuid is common and widely distributed in dry forests. Moths fly in late spring and early summer. Caterpillars feed on the foliage of snowbrush (*Ceanothus velutinus*), buckbrush (*Ceanothus cuneatus*), and bitterbrush (*Purshia tridentata*).

Similar species: ***Acronicta thoracica*** forewing pale gray with fine black streaking, hindwing white, widely distributed in the Rocky Mountain region.

134. *Cryphia cuerva*

Wingspan 2.4 cm. Forewing is black with gray or green markings. This noctuid is common and widely distributed in western North America, abundant in the volcanic lava fields of the Cascade Range. Moths fly in late summer. The caterpillar host plant is unknown.

135. *Alypia langtoni*

Wingspan 3.0 cm. Forewing is black with two round, cream-yellow spots; hindwing also with one or two round cream-yellow spots. This noctuid is common and widely distributed in western North America. Moths fly during the day from late spring to midsummer. Caterpillars feed on the foliage of fireweed (*Epilobium*).

Similar species: ***Alypia ridingsii*** forewing black with broad white patches and a small white spot in the midcostal area, the white patches in the forewing are lined by the black wing veins, common and widely distributed; ***Androloma maccullochi*** (Noctuidae) forewing black with broad white patches and a small white mid-costal spot, forewing and hindwing with white patches lined by black wing veins, widely distributed; species of ***Gnophaela***, such as ***Gnophaela vermiculata*** (1), have wings that are more elongate, antennae pectinate.

136. *Apamea antennata*

Wingspan 4.4 cm. Forewing is red-brown with large discal spots, postmedian band is lavender to purple, submarginal line is sharply dentate and extends to the wing margin. This noctuid is common and widely distributed in dry forests in western North America. Moths fly in early to midsummer. Caterpillars feed on grasses.

Similar species: at least 10 species of ***Apamea*** have similar red-brown wings; ***Apamea atriclava*** forewing with a brown postmedian band, common in wet coastal forests; ***Apamea auranticolor*** is smaller, forewing with obscure markings, occurs in dry forests; ***Apamea vultuosa*** forewing pale brown with a black costal margin and black submarginal dashes, occurs in wet conifer forests; ***Apamea alia*** forewing is pink-orange with obscure markings.

137. *Apamea occidens*

Wingspan 4.6 cm. Forewing is gray with well-defined lines and discal spots, a broad gray postmedian band, no dentate submarginal line. This noctuid is common and widely distributed in dry pine and juniper forests in western North America. Moths fly in early to midsummer. Caterpillars feed on grasses.

Similar species: about 14 species of ***Apamea*** have similar gray colors; ***Apamea acera*** forewing is pale gray and obscurely marked; ***Apamea centralis*** is part of a group of about 8 species that are smaller in size and have a sharply dentate submarginal line; the ***Apamea***, subgenus ***Crymodes***, group consists of about 4 species that have a pale gray to black-brown forewing with a mottled appearance, including ***Apamea devastator***, a pest of pastures and grain crops.

138. *Apamea castanea*

Wingspan 4.7 cm. Forewing is dark-brown to black-brown with the reniform spot narrowly edged with white. This noctuid is very abundant in wet conifer forests, particularly wet coastal forests. Moths fly in early to midsummer. Caterpillars feed on grasses.

Similar species: ***Apamea amputatrix*** forewing with higher contrasting marks and bands, widely distributed in western North America; ***Apamea dubitans*** forewing is dark red-brown with a large white reniform spot, widely distributed; ***Apamea plutonia*** is smaller, forewing is black-brown, occurs in wet coastal forests.

139. *Oligia indirecta*

Wingspan 3.1 cm. Forewing is light brown with a black median dash and black, dentate subanal spot; hindwing is brown. This noctuid is common and widely distributed in western North America, particularly common in wet coastal forests. Moths fly in midsummer. Caterpillars feed on the foliage of grasses and sedges.

Similar species: ***Oligia illocata*** is larger, forewing is dark brown with a large white reniform spot, abundant in wet coastal forests and in wet conifer forests of the northern Rocky Mountains, moths fly in fall, caterpillars feed on the foliage of alder (*Alnus*); ***Oligia tonsa*** is much smaller, forewing bicolored in black basally and pale gray distally, widely distributed; ***Oligia violacea*** forewing is mottled purple and lavender with yellow discal spots, hindwing white, widely distributed in dry forests; ***Oligia marina*** forewing is mottled black with a green tinge, occurs in dry forests of California and southwest Oregon; ***Euplexia benesimilis*** (Noctuidae) forewing is black with a pale brown postmedian band and a narrow white reniform spot, common in wet coastal forests.

140. *Aseptis fumosa*

Wingspan 3.8 cm. Forewing is brown with the reniform and orbicular spots distinctly outlined in dark brown. This noctuid is common and occurs in the dry forests of the Pacific Northwest. Moths fly in midsummer. Caterpillars feed on foliage of deerbrush (*Ceanothus integerrimus*) and bitterbrush (*Purshia tridentata*).

Similar species: many of the species of ***Euxoa*** have a similar appearance, such as ***Euxoa satis*** **(201)**, however species of ***Aseptis*** possess small erect tufts of hair on the dorsum of the abdomen.

141. *Aseptis ethnica*

Wingspan 3.9 cm. Forewing is dark brown to black with the only noticeable markings the white flecks along the postmedian line. This noctuid is common in dry forests and woodlands of western Oregon and California. Moths fly in midsummer. Caterpillars feed on foliage of manzanita (*Arctostaphylos*).

Similar species: ***Apamea plutonia*** (Noctuidae) has the reniform spot weakly edged in white, occurs in the wet forests of the coast range in Oregon, caterpillars feed on grasses; ***Melanchra pulverulenta*** (Noctuidae) has a prominent white spot on the lower distal margin of the forewing, uncommon.

142. *Aseptis binotata*

Wingspan 3.4 cm. Forewing is dark brown with a round yellow mark on the outer margin of the reniform spot. This noctuid is common and widely distributed in western North America. Moths fly in midsummer. Caterpillars are generalist feeders on foliage of flowering trees and shrubs such as maple (*Acer*), alder (*Alnus*), madrone (*Arbutus menziesii*), hazelnut (*Corylus*), Indian plum (*Oemleria cerasiformis*), ocean spray (*Holodiscus discolor*), currant (*Ribes*), willow (*Salix*), and snowbrush (*Ceanothus velutinus*).

Similar species: ***Aseptis adnixa*** forewing is more mottled in yellow and brown, occurs primarily in the wet coastal forests, we have collected and reared caterpillars only on foliage of Indian plum (*Oemleria cerasiformis*); ***Aseptis paviae*** is larger and pale gray, occurs in southwest Oregon and California, caterpillar host plant unknown.

143. *Papaipema insulidens*

Wingspan 3.9 cm. Forewing is falcate, orange and gray with checkered white reniform and median spots. This noctuid is common and widely distributed in wet conifer forests and meadows. Moths fly in fall. Caterpillars bore in stems of composites (Asteraceae), particularly in ragworts (*Senecio*).

144. *Hydraecia medialis*

Wingspan 4.6 cm. Forewing is variable red-brown to green-gray with a straight, white postmedian line. This noctuid is common and widely distributed in western North America, often abundant in ponderosa pine forests. Moths fly in fall. Caterpillars bore in stems of grasses and herbs.

Similar species: some species of ***Amphipoea*** (Noctuidae) are similar in appearance but smaller with caterpillars that bore into and feed on grass rhizomes and roots; ***Amphipoea americana*** forewing is orange to red with orange discal spots, abundant in wet coastal forests; ***Amphipoea lunata*** forewing is red with narrow reniform spots, occurs in dry forests of California and southwest Oregon; ***Amphipoea senilis*** forewing is pale yellow or pink, abundant in dry, open ponderosa pine forests east of the Cascade Mountains; ***Amphipoea keiferi*** forewing is dark brown with pale discal spots, hindwing black, abundant in ponderosa pine forests east of the Cascade Mountains.

145. *Phlogophora periculosa*

Wingspan 4.5 cm. Forewing is pale pink-orange with a darker red-brown median band and the discal spots joined together. This noctuid is common in wet coastal forests. Moths fly in midsummer. Caterpillars feed on the foliage of flowering trees, shrubs, and herbs such as cherry (*Prunus*), hazelnut (*Corylus*), and willow (*Salix*), as well as swordfern (*Polystichum munitum*).

146. *Andropolia diversilineata*

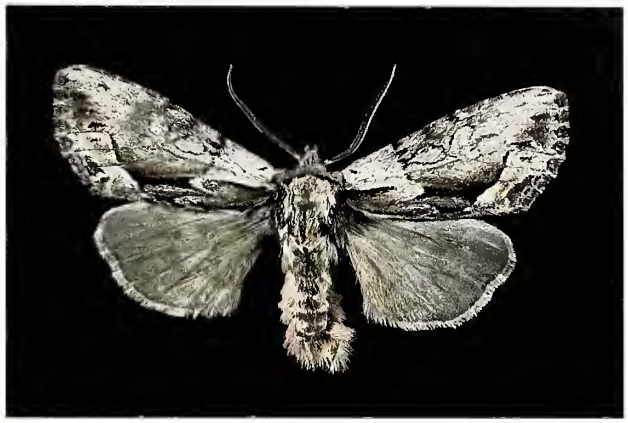
Wingspan 4.4 cm. Forewing is gray with very obscure markings except for a jagged, dentate black submarginal line; males have pectinate antennae. This noctuid is common and widely distributed in pine forests and juniper woodlands in western North America. Moths fly in late summer. Caterpillars feed on the foliage of bitterbrush (*Purshia tridentata*).

147. *Andropolia aedon*

Wingspan 4.6 cm. Forewing is gray with distinct discal spots outlined in black, including a jagged, dentate black submarginal line. This noctuid is common in wet conifer forests in the Pacific West. Moths fly in mid to late summer. Caterpillars feed on the foliage of alder (*Alnus*), maple (*Acer*), ocean spray (*Holodiscus discolor*), and ninebark (*Physocarpus capitatus*).

Similar species: ***Andropolia theodori*** forewing is pink to purple, hindwing red, uncommon but widely distributed in dry forests, caterpillars feed on snowbrush (*Ceanothus velutinus*) and ocean spray (*Holodiscus discolor*).

148. *Hyppa brunneicrista*



Wingspan 4.0 cm. Forewing is pale gray with a black band along the inner margin bordered with red-brown, inner margin with black band interrupted by a jagged basal line; males with strongly pectinate antennae. This noctuid is common and occurs in high elevation conifer forests in the Rocky Mountains and Cascade Mountains. Moths fly in early summer. Caterpillars feed on the foliage of alder *(Alnus)* and fireweed *(Epilobium)*.

Similar species: ***Hyppa xylinoides*** is larger, forewing more elongate, the male antennae only weakly pectinate, common and widely distributed in western North America, caterpillars feed on the foliage of flowering trees and shrubs; ***Hyppa indistincta*** forewing with a continuous black band along the inner margin that is not interrupted by the basal line, male antennae filiform, common in dry forests in the Pacific West.

149. *Amphipyra pyramidoides*

Wingspan 5.1 cm. Forewing is light brown to black-brown with a pale submarginal border and the discal spots greatly reduced; hindwing is orange to red-copper. This noctuid is common in wet conifer forests west of the Cascade Mountains. Moths fly in late summer and fall. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs such as maple (*Acer*), alder (*Alnus*), manzanita (*Arctostaphylos*), ocean spray (*Holodiscus discolor*), and snowbrush (*Ceanothus velutinus*).

Similar species: ***Amphipyra tragopoginis*** is smaller, wings are dull brown with small black discal spots, widely distributed, caterpillars feed on herbs; ***Amphipyra glabella*** forewing is pale gray to black with a contrasting white submarginal border, widely distributed in the Rocky Mountain region, caterpillars feed on the foliage of poplar (*Populus*).

150. *Platyperigea montana*

Wingspan 3.0 cm. Forewing is pale brown to dark gray with a small black reniform spot; hindwing is white. This noctuid is abundant and widely distributed in western North America, particularly in dry forests. Moths fly in late summer. Caterpillars feed on the foliage of alfalfa (*Medicago*).

Similar species: ***Platyperigea meralis*** is darker and occurs in the Rocky Mountain region; ***Caradrina morpheus*** (Noctuidae) has large black discal spots and is an exotic Eurasian species accidentally introduced into the Pacific Northwest; ***Proxenus miranda*** (Noctuidae) forewing is black-brown, hindwing white, common in wet conifer forests in the Pacific West, caterpillars feed on the foliage of herbaceous plants.

151. *Achytonix epipaschia*

Wingspan 3.4 cm. Forewing is dark gray to black with gray to red-brown discal spots and the reniform spot at the end of the discal cell slight curved. This noctuid is widely distributed in western North America, particularly common in wet conifer forests in the Pacific West. Moths fly in late summer. Caterpillars feed on the foliage of species of Pinaceae, commonly found on Douglas-fir (*Pseudotsuga menziesii*).

Similar species: ***Achytonix praeacuta*** forewing pale white-gray with a strongly curved reniform spot, widely distributed, moths fly in midsummer.

152. *Cosmia calami*

Wingspan 3.2 cm. Forewing is pale yellow to light brown with small discal spots, basal line strongly transverse and nearly touching the postmedian line along the inner margin; hindwing is white. This noctuid is common in oak woodlands in the Pacific West. Moths fly in midsummer. Caterpillars feed on the foliage of oak (*Quercus*).

Similar species: four species in the noctuid genus ***Ipimorpha*** (Noctuidae) have a completely straight basal line and two species in the noctuid genus ***Enargia*** (Noctuidae) have a v-shaped basal line. These species occur in the Rocky Mountain region, caterpillars feed on willow (*Salix*) and quaking aspen (*Populus tremuloides*).

153. *Zotheca tranquilla*

Wingspan 3.6 cm. Forewing is white with a green median band and thin wavy basal and postmedian lines; hindwing is white. This noctuid is common and widely distributed in wet coastal forests and riparian forests east of the Cascade Mountains. Moths fly in midsummer. Caterpillars feed on the foliage of elderberry (*Sambucus*).

154. *Xylena cineritia*

Wingspan 5.1 cm. Forewing is elongate, gray with a narrow yellow subapical streak, discal spots small and touching, reniform spot strongly curved outward. This noctuid is common and widely distributed in high elevation conifer forests. Moths fly in fall until spring. Caterpillars feed on the foliage of rose (*Rosa*), elderberry (*Sambucus*), and spiraea (*Spiraea*).

Similar species: ***Xylena curvimacula*** forewing with a broad yellow subapical streak that extends inward across the discal cell, widespread in wet coastal forests and in riparian forests east of the Cascade Mountains; ***Xylena nupera*** forewing is yellow-brown with a small, straight reniform spot and a black median streak, widely distributed; ***Xylena thoracica*** forewing is gray with large discal spots, a small yellow subapical streak, common in high elevation conifer forests of the Cascade Mountains and Rocky Mountain region; ***Xylena brucei*** forewing is gray with large discal spots but no yellow streak, occurs in ponderosa pine forests.

155. *Lithophane contenta*

Wingspan 4.1 cm. Forewing is gray with obscure discal spots; hindwing is pale gray. This noctuid is abundant in dry forests in the Pacific West. Moths fly in fall and into early spring. Caterpillars feed on the foliage of oak (*Quercus*).

Similar species: ***Lithophane georgii*** **(156)** is larger, forewing pale gray with small black submarginal spots; ***Lithophane longior*** forewing is gray with a dark median band, hindwing pale gray, occurs in dry forests east of the Cascade Mountains, caterpillars feed on the foliage of juniper (*Juniperus*); ***Lithophane gausapata*** wings red-gray, occurs in the Pacific West, caterpillars feed on incense cedar (*Calocedrus decurrens*); ***Lithophane amanda*** forewing is pale gray with a yellow-orange subapical patch, hindwing pale gray, caterpillars feed on willow (*Salix*); ***Lithophane innominata*** forewing is pale yellow, hindwing black; ***Lithophane petulca*** forewing is dark red-brown, hindwing black; ***Lithophane baileyi*** forewing is white with black markings, hindwing black.

156. *Lithophane georgii*

Wingspan 4.8 cm. Forewing is pale gray with a submarginal line of small black spots; hindwing is dark gray. This noctuid is common and widely distributed in western North America. Moths fly in fall and into spring. Caterpillars feed on the foliage of flowering trees and shrubs such as maple (*Acer*), alder (*Alnus*), dogwood (*Cornus*), hawthorn (*Crataegus*), ash (*Fraxinus*), cherry (*Prunus*), currant (*Ribes*), rose (*Rosa*), and willow (*Salix*).

Similar species: ***Lithophane pertorrida*** forewing is dark gray with a contrasting white orbicular spot, widely distributed, caterpillars feed on the foliage of flowering trees and shrubs; ***Lithophane contenta*** **(155)** is smaller, forewing gray and without black submarginal spots; ***Lithomoia solidaginis*** (Noctuidae) forewing is gray with a large white reniform spot and black submarginal dashes, occurs in high elevation conifer forests, caterpillars feed on the foliage of huckleberry (*Vaccinium*).

157. *Lithophane dilatocula*

Wingspan 4.7 cm. Forewing is dark gray to black-gray with greatly enlarged, round discal spots, the oribicular spot white or pale gray, the reniform spot orange; hindwing is red-gray. This noctuid is common and occurs in wet coastal forests in the Pacific West and in riparian forests east of the Cascade Mountains. Moths fly in fall and into spring. Caterpillars feed on the foliage of alder (*Alnus*).

Similar species: ***Lithophane thaxteri*** forewing with black basal and median dashes and a jagged black submarginal line, occurs in high elevation conifer forests, caterpillars feed on the foliage of hardwoods; ***Lithophane atara*** forewing is dark gray, hindwing pink, widely distributed, caterpillars feed on the foliage of species of Pinaceae.

158. *Mesogona olivata*

Wingspan 4.1 cm. Forewing may be a varying mix of yellow, gray, or red-brown with large strongly outlined discal spots; hindwing is gray. This noctuid is widely distributed in western North America, particularly common in dry forests in the Pacific West. Moths fly in fall. Caterpillars feed on the foliage of flowering trees and shrubs such as snowbrush (*Ceanothus velutinus*), bitterbrush (*Purshia tridentata*), oak (*Quercus*), and currant (*Ribes*).

Similar species: ***Mesogona subcuprea*** forewing is yellow to pale gray, hindwing copper-red, occurs in the Pacific West, caterpillars feed on the foliage of oak (*Quercus*); ***Homoglaea carbonaria*** (Noctuidae) forewing is gray to red-brown and lacks strongly outlined discal spots, caterpillars feed on the foliage of willow (*Salix*); ***Homoglaea dives*** forewing is dark brown to black and lacks strongly outlined discal spots, caterpillars feed on the foliage of willow (*Salix*).

159. *Mesogona rubra*

Wingspan 4.2 cm. Forewing is red, pink-gray, or pale pink, with obscure discal spots; hindwing is red. This species was recently described by one of us (PCH) and Lars Crabo with some of the type specimens provided by caterpillars that were field-collected and reared by one of us (JCM). This is just one example of how the collection, description, and host plant relationships of many species remain to be discovered. This noctuid is common and occurs in dry forests in the Pacific West. Moths fly in fall. Caterpillars feed on the foliage of manzanita (*Arctostaphylos*).

Similar species: ***Orthosia mys*** **(188)** forewing is falcate, hindwing pale pink-white.

160. *Agrochola purpurea*

Wingspan 3.6 cm. Forewing is light red to purple with a black subapical patch and black in the lower half of the reniform spot; hindwing is red-gray. This noctuid is common and widely distributed in dry forests in western North America. Moths fly in fall and early winter. Caterpillars feed on the foliage of lupine (*Lupinus*).

Similar species: a group of very similar noctuids fly in fall and winter and have caterpillars that are generalist feeders on the foliage of flowering trees and shrubs; ***Agrochola pulchella*** forewing with contrasting red, purple and orange bands; ***Eupsilia tristigmata*** (Noctuidae) forewing is red-brown, hindwing black; ***Sunira decipiens*** (Noctuidae) forewing is pale yellow to orange, hindwing white; ***Xanthia togata*** (Noctuidae) forewing is yellow with purple spots, hindwing yellow; ***Anathix puta*** (Noctuidae) forewing is pale brown, gray or dark brown, hindwing gray.

161. *Fishia evelina*

Wingspan 4.3 cm. Forewing is elongate, dark gray with a red median patch and the submarginal line strongly dentate; hindwing is mostly white in males, gray in females. This noctuid is common and widely distributed in dry forests. Moths fly in fall. Caterpillars feed on the foliage of manzanita (*Arctostaphylos*), snowbrush (*Ceanothus velutinus*), cherry (*Prunus*), bitterbrush (*Purshia tridentata*), and elderberry (*Sambucus*).

Similar species: ***Fishia yosemitae*** forewing is pale gray with strongly jagged dentate markings, occurs in pine forests and juniper woodlands east of the Cascade Mountains, moths fly in fall.

162. *Platypolia contadina*

Wingspan 4.0 cm. Forewing is black with large discal spots and other markings strongly outlined in white, the submarginal line strongly dentate; hindwing is black; populations in wet coastal forests have a white postmedian band, but populations from the high Cascade Mountains east to the Rocky Mountains have a black postmedian band. This noctuid is widely distributed in wet conifer forests of western North America. Moths fly in fall. Caterpillars feed on the foliage of flowering trees and shrubs, particularly huckleberry (*Vaccinium*).

Similar species: ***Platypolia loda*** hindwing is white, widely distributed in dry forests, caterpillars feed on both flowering trees and shrubs and conifers; ***Xylotype acadia*** (Noctuidae) forewing is gray with large discal spots, occurs in high elevation conifer forests, caterpillars feed on larch (*Larix*); species of ***Papestra*** (Noctuidae) fly in spring.

163. *Brachylomia algens*

Wingspan 2.9 cm. Forewing is mottled brown to dark gray-brown with a wedge-shaped reniform spot. This noctuid is common in wet coastal forests in the Pacific West. Moths fly in mid to late summer. Caterpillars feed on the foliage of birch (*Betula*), poplar (*Populus*), rose (*Rosa*), and willow (*Salix*).

Similar species: five species of ***Brachylomia*** occur in western North America; ***Brachylomia rectifascia*** is the most common and widely distributed of these with a black longitudinal median band across the forewing, caterpillars feed on the foliage of flowering trees and shrubs; ***Epidemas cinerea*** (Noctuidae) is larger, forewing elongate and dark gray, hindwing is white in the males, widely distributed, moths fly in fall.

164. *Feralia deceptiva*

Wingspan 4.0 cm. Forewing is dark green with black and white markings; hindwing is solid black. This noctuid is abundant in wet coastal forests in the Pacific West. Moths fly in early spring. Caterpillars feed on the foliage of Douglas-fir (*Pseudotsuga menziesii*).

Similar species: ***Feralia comstocki*** **(165)** forewing pale green with black patches; ***Feralia februalis*** **(166)** hindwing white.

165. *Feralia comstocki*

Wingspan 3.9 cm. Forewing is pale green with black patches; hindwing is white with a black submarginal border. This noctuid is widely distributed in western North America. Moths fly in early spring. Caterpillars feed on the foliage of species of Pinaceae.

Similar species: ***Feralia deceptiva*** **(164)** forewing dark green without black patches; ***Feralia februalis*** **(166)** hindwing white.

166. *Feralia februalis*

Wingspan 3.4 cm. Forewing is pale green with large discal spots; hindwing is white. This noctuid is abundant in dry forests in the Pacific West. Moths fly in late winter and early spring. Caterpillars feed on the foliage of oak (*Quercus*).

Similar species: ***Feralia deceptiva*** **(164)** and ***Feralia comstocki*** **(165)** hindwing with black shading.

167. *Pleromella opter*

Wingspan 3.7 cm. Forewing is pale gray and marked by a thin straight dark postmedian line that extends to the apex; hindwing is variable white to gray. This noctuid is common in dry forests in the Pacific West. Moths fly in early spring. Caterpillars feed on the foliage of manzanita (*Arctostaphylos*).

Similar species: ***Pleromelloida cinerea*** (Noctuidae) forewing with a broad postmedian line with small black spots, widely distributed in western North America, moths fly in fall, caterpillars feed on the foliage of snowberry (*Symphoricarpos albus*); ***Pleromelloida obliquata*** forewing with jagged black lines, widely distributed in western North America, moths fly in the early spring, caterpillars feed on foliage of snowberry; species of ***Cucullia***, such as ***Cucullia intermedia*** **(172)**, are larger, forewing more elongate, moths fly in early summer.

168. *Oncocnemis sandaraca*

Wingspan 3.2 cm. Forewing is mottled red-gray; hindwing is yellow with a broad black submarginal border. This noctuid is common and occurs in dry forests in the Pacific West. Moths fly in late summer and fall. The caterpillar host plant is unknown.

Similar species: ***Oncocnemis hayesi*** forewing is pale yellow-brown to yellow-gray, widely distributed in the Rocky Mountain region; ***Oncocnemis albifasciata*** forewing is pale cream with a black median band and black submarginal band on both wings, widely distributed in dry forests of western North America.

169. *Oncocnemis greyi*

Wingspan 3.1 cm. Forewing is pale gray with a red submarginal border and no discal spots, the black basal line nearly straight, the postmedian line strongly curved inward and connected to the basal line with a black median bar; hindwing is brown. This noctuid is common and widely distributed in western North America. Moths fly in midsummer. Caterpillars feed on the foliage of snowberry (*Symphoricarpos albus*).

Similar species: three other species of ***Oncocnemis*** have a gray forewing and a basal line that is more strongly curved outward; ***Oncocnemis figurata*** hindwing is brown, widely distributed in western North America; ***Oncocnemis semicollaris*** hindwing is white, occurs in the Cascade Mountains from Oregon to British Columbia; ***Oncocnemis ragani*** is larger, hindwing white, common in California and southwest Oregon.

170. *Oncocnemis dunbari*

Wingspan 3.4 cm. Forewing is mottled gray with large round discal spots; hindwing is white with a gray submarginal border. This noctuid is common in wet coastal forests west of the Cascade Mountains. Moths fly in late summer and fall. Caterpillars feed on the foliage of oceanspray (*Holodiscus discolor*).

Similar species: ***Oncocnemis chandleri*** forewing is streaked with black, discal spots elongate and fused together, hindwing white with a broad black submarginal border, widely distributed in dry forests; ***Oncocnemis chorda*** forewing is pale brown with a dark border and narrow black basal and postmedian lines, hindwing white with a broad black submarginal border; ***Oncocnemis extremis*** forewing with black bands and a white reniform spot and narrow black basal and postmedian lines, hindwing white with a broad black submarginal border; ***Oncocnemis columbia*** forewing is dark black-gray with narrow black basal and postmedian lines, hindwing white with a broad black submarginal border, caterpillars feed on ocean spray; ***Oncocnemis youngi*** forewing is light red-gray with narrow black basal and postmedian lines, hindwing white with a broad black submarginal border, caterpillars feed on ocean spray.

171. *Behrensia conchiformis*

Wingspan 2.9 cm. Forewing is black with a large white orbicular spot and a pale gray postmedian band; hindwing is white with a black border. This noctuid is widely distributed in western North America. Moths fly in early spring. The caterpillar host plant is unknown.

172. *Cucullia intermedia*

Wingspan 4.8 cm. Forewing is elongate, gray with no distinct markings; hindwing is brown. This is the most common and widely distributed species of the forest-inhabiting ***Cucullia***. Moths fly in late spring and early summer. Caterpillars feed on the flower heads of herbaceous Asteraceae.

Similar species: ***Cucullia speyeri*** has the basal part of the hindwing white with a brown submarginal band, occurs in pine forests and juniper woodlands; ***Cucullia florea*** forewing is gray with a black comma-shaped subanal spot and more distinct discal spots, occurs in high-elevation spruce-fir forests; ***Cucullia postera*** forewing with a red-orange costal band, a black comma-shaped subanal spot and more distinct discal spots, occurs in high-elevation spruce-fir forests; ***Cucullia similaris*** forewing is gray, discal spots outlined with small black dots, occurs in juniper-pine forests; ***Dolichocucullia dentilinea*** (Noctuidae) forewing with thin jagged basal and postmedian lines, common in coastal forests.

173. *Sideridis rosea*

Wingspan 4.4 cm. Forewing is light orange to red-brown with a dark red-brown submarginal border, discal spots outlined in black; hindwing is white with a dark border; thorax is dark red-brown; abdomen is yellow. This noctuid is widely distributed in wet forests over much of western North America. Moths fly in late spring. Caterpillar host plants are gooseberries (*Ribes*) and willows (*Salix*).

Similar species: ***Sideridis maryx*** forewing is dark red-black without markings, hindwing dark, occurs at high elevations in the northern Rocky Mountains and Cascade Mountains, caterpillar host plant unknown.

174. *Polia nimbosa*

Wingspan 5.0 cm. Forewing is white with large discal spots and submarginal spots outlined in black; hindwing is pale brown. This noctuid is abundant in wet coastal forests. Moths fly in midsummer. Caterpillars feed on the foliage of red alder (*Alnus rubra*).

Similar species: ***Polia discalis*** forewing is pale gray with obscure markings, widely distributed in wet conifer forests of western North America, caterpillars are generalist feeders on the foliage of flowering trees and shrubs; ***Lasionycta wyatti*** (Noctuidae) is smaller and confined to coastal sand dunes.

175. *Polia purpurissata*

Wingspan 4.8 cm. Forewing is purple-lavender with a jagged, dentate black submarginal line; hindwing is brown. This noctuid is widely distributed in western North America, particularly abundant in ponderosa pine forests. Moths fly in midsummer. Caterpillars feed on the foliage of many flowering trees and shrubs, often found on bitterbrush (*Purshia tridentata*).

Similar species: ***Polia nugata*** forewing with streaks of gray, hindwing white, widely distributed in western North America, particularly abundant in juniper and pinyon pine woodlands.

176. *Lacanobia liquida*

Wingspan 3.9 cm. Forewing is gray to black with a pale gray to white orbicular spot and the submarginal line strongly dentate. Populations west of the Cascade Mountains have a contrasting white postmedian band, while populations east of the Cascade Mountains are uniformly gray. This noctuid is common and widely distributed in western North America. Moths fly in late spring. Caterpillars feed on the foliage of *Aster*.

Similar species: eight species in this genus are very similar in appearance and each with the caterpillar feeding mostly on flowering trees and shrubs and a few feed on herbs; ***Lacanobia tacoma*** forewing with a purple-lavender postmedian band, occurs in the Pacific West; ***Lacanobia dodii*** forewing with a purple-lavender postmedian band, occurs in the Rocky Mountains; ***Lacanobia lilacina*** forewing is dark or pale lavender and lacks the dentate submarginal line; ***Lacanobia grandis*** is larger, forewing with a pale white postmedian band and black basal and median bars, limited to the Cascade Mountains; ***Lacanobia subjuncta*** forewing with a brown postmedian band, widely distributed, sometimes a pest in fruit orchards; ***Lacanobia nevadae*** forewing is dark red-brown with a thin white submarginal line, occurs in ponderosa pine forests; ***Lacanobia radix*** forewing is uniformly pale gray or red-brown with a small black basal dash, occurs in cool wet conifer forests.

177. *Papestra invalida*

Wingspan 4.6 cm. Forewing is black mottled with gray, markings obscure, discal spots large, the submarginal line sharply dentate; abdomen with small black mid-dorsal hair tufts. This noctuid is widely distributed in ponderosa pine forests east of the Cascade Mountains. Moths fly in late spring and early summer. Caterpillars feed on the foliage of bitterbrush (*Purshia tridentata*).

Similar species: ***Papestra cristifera*** is smaller, forewing with markings more strongly outlined in white, widely distributed in high-elevation conifer forests; ***Papestra quadrata*** is smaller, forewing with a broad pale gray postmedian band, common in the Rocky Mountain region; ***Melanchra adjuncta*** (Noctuidae) forewing is black with a large white reniform spot and white submarginal border, widely distributed in wet conifer forests; ***Melanchra pulverulenta*** forewing is black with a white subanal spot, widely distributed in wet conifer forests; ***Lacanobia lutra*** forewing is black with pale red to pink reniform and subanal spots, widely distributed in wet conifer forests; species of ***Platypolia*** **(162)** fly in fall.

178. *Lasionycta perplexa*

Wingspan 3.7 cm. Forewing is dark black-gray with a pale gray orbicular spot. This noctuid is abundant and widely distributed in higher elevation conifer forests. Moths fly in early to midsummer. Caterpillars feed on the foliage of alder (*Alnus*).

Similar species: ***Lasionycta mutilata*** forewing is pale gray with a very large reniform spot outlined in black, occurs in subalpine forests of the high Cascade Mountains; ***Lasionycta wyatti*** is larger, forewing is white with large discal spots, endemic to coastal sand dunes. Also, many similar species occur in alpine habitats.

179. *Lacinipolia cuneata*

Wingspan 3.0 cm. Forewing is pale gray with a dark black-gray median area; hindwing is dark brown. This noctuid is abundant, but narrowly endemic to wet coastal forests. Moths fly in early summer. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs.

Similar species: ***Lacinipolia vicina*** forewing is uniformly gray, hindwing white, widely distributed in dry forests and rangelands in western North America; ***Lacinipolia pensilis*** forewing is uniformly black-gray, hindwing with a dark submarginal band, widely distributed, and particularly abundant in ponderosa pine forests; ***Hecatera sutrina*** (Noctuidae) is larger, forewing with a jagged, dentate median spot, limited to high elevation forests in the Cascade and Rocky Mountains.

180. *Lacinipolia rectilinea*

Wingspan 2.8 cm. Forewing is variable, black with a white reniform spot, or black with a white postmedian band and black subanal dash. This noctuid is abundant in wet forests in western North America. Moths fly in summer. Caterpillars feed on the foliage of herbs.

Similar species: ***Lacinipolia olivacea*** forewing with a pale basal area; ***Lacinipolia davena*** forewing with a black basal area; ***Lacinipolia illaudabilis*** forewing with pale green basal and postmedian bands; ***Lacinipolia stricta*** forewing is red-brown with a narrow white reniform spot; ***Lacinipolia patalis*** forewing is uniformly pale gray with large discal spots fused together, endemic to coastal forests.

181. *Leucania farcta*

Wingspan 3.8 cm. Forewing is pink to light red with few markings; hindwing is white. This noctuid is abundant in meadows of wet conifer forests in the Pacific Northwest. Moths fly in early to late summer. Caterpillars are climbing cutworms that feed on grasses.

Similar species: a large group of similar looking species occur in western North America; ***Leucania anteoclara*** forewing is gray, hindwing is white, occurs in the Pacific West; ***Leucania multilinea*** forewing with a black streak, occurs in the Rocky Mountain region; ***Leucania commoides*** forewing is dark pink-gray, hindwing is gray, occurs in dry forests; ***Leucania insueta*** forewing is gray with a postmedian line of small black spots, hindwing gray, widely distributed in high elevation conifer forests; ***Aletia oxygala*** (Noctuidae) forewing is yellow, hindwing is black, widely distributed.

182. *Perigonica angulata*

Wingspan 3.6 cm. Forewing is strongly falcate, pale yellow to red with faint markings; hindwing is white; males with filiform antennae. This noctuid is abundant in dry forests in the Pacific West. Moths fly in spring. Caterpillars feed on the foliage of chinquapin (*Chrysolepis chrysophylla*) and canyon live oak (*Quercus chrysolepis*).

Similar species: ***Perigonica tertia*** forewing is speckled with small black dots, males with pectinate antennae, abundant in oak woodlands in the Pacific West, caterpillars feed on Oregon white oak (*Quercus garryana*) and tan oak (*Lithocarpus densiflorus*).

183. *Perigonica pectinata*

Wingspan 3.5 cm. Forewing is slightly falcate, variable pale yellow, pink, orange or gray, often with a black reniform spot; hindwing is black; males with pectinate antennae. This noctuid is abundant in dry forests in the Pacific West. Moths fly in early spring. Caterpillars feed on the foliage of chinquapin (*Chrysolepis chrysophylla*) and canyon live oak (*Quercus chrysolepis*).

184. *Acerra normalis*

Wingspan 4.0 cm. Forewing is gray with reniform and orbicular spots fused together and outlined in black. This noctuid is widely distributed in western North America. Moths fly in early spring. Caterpillars feed on the foliage of oceanspray (*Holodiscus*), bitterbrush (*Purshia*), willow (*Salix*), and mountain mahogany (*Cercocarpus*).

Similar species: species of ***Cerastis***, such as ***Cerastis enigmatica*** **(205)**, and ***Stretchia***, such as ***Stretchia muricina*** **(185)**, are smaller, forewing with fused discal spots not strongly outlined in black.

185. *Stretchia muricina*

Wingspan 3.2 cm. Forewing with the orbicular and reniform spots fused together to form a large, white v-shaped spot, the median area dark gray to red with the discal spots outlined in black, the postmedian and submarginal area white to pale gray; males with pectinate antennae. This noctuid is common and widely distributed in wet conifer forests of western North America. Moths fly in early spring. Caterpillars feed on the foliage of currant and gooseberry (*Ribes*).

Similar species: ***Stretchia pictipennis*** is larger, forewing with a gray submarginal area, endemic to California and southwest Oregon; ***Stretchia plusiaeformis*** forewing is more pointed and uniform gray without the dark median area, widely distributed in dry forests, caterpillars feed on the foliage of currant (*Ribes*); ***Acerra normalis*** **(184)** is larger, forewing with fused discal spots broadly outlined in black; ***Cerastis enigmatica*** **(205)** forewing is red-brown, prothoracic collar is pale yellow, male antennae filiform.

186. *Orthosia transparens*

Wingspan 3.7 cm. Forewing is falcate, light red to dark red-brown with a black reniform spot; hindwing is dark gray to black; males with filiform antennae. This noctuid is common in dry forests in the Pacific West. Moths fly in early spring. Caterpillars feed on the foliage of madrone (*Arbutus menziesii*) and rhododendron (*Rhododendron*).

Similar species: ***Orthosia pulchella*** forewing is gray, red or brown, often with a black median band, male antennae strongly pectinate, widely distributed in western North America, moths fly in early spring, caterpillars feed on the foliage of manzanita (*Arctostaphylos*); ***Orthosia mys*** **(188)** hindwing is pink-white, moths fly in fall, caterpillars feed on foliage of manzanita (*Arctostaphylos*).

187. *Orthosia praeses*

Wingspan 3.8 cm. Forewing may vary from orange-tan to dark red-brown with a pale submarginal line and large discal spots that are usually obscure; hindwing is light red-gray; prothoracic collar is pale yellow or red; thorax is dark brown. This noctuid is common in wet conifer forests in the Pacific West. Moths fly in early spring. Caterpillars feed on the foliage of deerbrush (*Ceanothus integerrimus*) and spiraea (*Spiraea*).

Similar species: ***Orthosia segregata*** forewing is gray with large discal spots and a black median bar, hindwing gray, widely distributed in the northern Rocky Mountain region, caterpillars feed on buffaloberry (*Shepherdia*).

188. *Orthosia mys*

Wingspan 3.5 cm. Forewing is falcate, pale to dark red with few markings; hindwing is pink-white; males with pectinate antennae. This noctuid is common and occurs in dry forests in the Pacific West. Moths fly in fall. Caterpillars feed on the foliage of manzanita (*Arctostaphylos*).

Similar species: ***Orthosia transparens*** **(186)** and ***Orthosia pulchella*** forewing is gray, red or brown, often with a black median band, hindwing gray-black, moths fly in early spring, caterpillars feed on the foliage of manzanita; ***Mesogona rubra*** **(159)** is larger, forewing more rounded, hindwing red, caterpillars feed on foliage of manzanita (*Arctostaphylos*).

189. *Orthosia ferrigera*

Wingspan 3.1 cm. Forewing is streaky yellow to orange-red with a dark reniform spot; hindwing is pink-gray. This noctuid is common and occurs in dry forests in the Pacific West. Moths fly in early spring. Caterpillars feed on the foliage of oak (*Quercus*).

190. *Orthosia pacifica*

Wingspan 3.9 cm. Forewing is mottled yellow-brown with a narrow dark reniform spot; hindwing is pale brown. This noctuid is common in dry forests in the Pacific West. Moths fly in early spring. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs such as madrone (*Arbutus menziesii*), manzanita (*Arctostaphylos*), oak (*Quercus*), and snowbrush (*Ceanothus velutinus*).

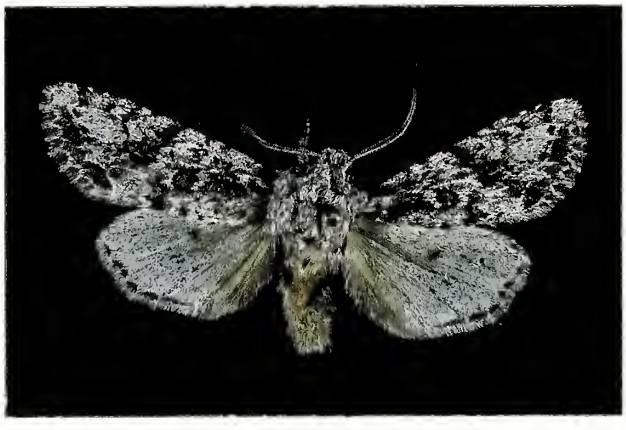
Similar species: ***Orthosia terminata*** forewing is dark gray with obscure markings and a pale submarginal band, hindwing black, moths fly in spring; ***Orthosia arthrolita*** forewing is falcate and yellow-gray with a black discal spot, hindwing black, moths fly in fall; ***Orthosia behrensiana*** forewing may vary in a mix of colors from pale yellow, gray, and red with a black bar at the reniform spot, hindwing white, moths fly in spring; ***Orthosia hibisci*** **(191)** forewing with large round discal spots; ***Orthosia revicta*** forewing is pale gray-lavender with red shades and a red submarginal line, widely distributed in wet conifer forests, caterpillars feed on the foliage of flowering trees and shrubs, particularly cherry (*Prunus*).

191. *Orthosia hibisci*

Wingspan 3.8 cm. Forewing with a varying mix of colors of pale lavender, purple-gray, and dark red-brown with large round discal spots: hindwing is gray. This noctuid is abundant and widely distributed in western North America. Moths fly in early spring. Caterpillars feed on the foliage of flowering trees and shrubs such as maple (*Acer*), alder (*Alnus*), oak (*Quercus*), cherry (*Prunus*), buckthorn (*Rhamnus purshiana*), willow (*Salix*), and elderberry (*Sambucus*). This species may be a pest in fruit orchards.

Similar species: ***Orthosia revicta*** forewing is pale gray-lavender with red shades and a red submarginal line, widely distributed in wet conifer forests, caterpillars are generalist feeders on the foliage of flowering trees and shrubs, particularly cherry (*Prunus*); ***Orthosia pacifica*** **(190)** forewing is yellow-brown with a narrow dark reniform spot.

192. *Egira februalis*



Wingspan 3.7 cm. Forewing is mottled black and white; hindwing is pale cream. This noctuid is common in the Pacific West in dry forests. Moths fly in early spring. Caterpillars feed on the foliage of oak (*Quercus*).

Similar species: ***Egira cognata*** forewing is mottled black and pale brown, hindwing pale yellow, common in wet conifer forests in the Pacific West, caterpillars are generalist feeders on the foliage of flowering trees and shrubs.

193. *Egira simplex*

Wingspan 3.6 cm. Forewing is pale gray with a very large orbicular spot and a continuous line of black postmedian dashes; hindwing is white with a large black discal spot. This noctuid is abundant and widely distributed in western North America. Moths fly in early spring. Caterpillars feed on the foliage of cherry (*Prunus*), currant (*Ribes*), and willow (*Salix*).

Similar species: ***Egira crucialis*** forewing with a small orbicular spot and a broken line of black postmedian dashes, abundant in wet conifer forests west of the Cascade Mountains but more resticted to riparian forests east of the Cascade Mountains, caterpillars feed on alder (*Alnus*), snowbrush (*Ceanothus velutinus*), bitterbrush (*Purshia tridentata*), oak (*Quercus*), and spiraea (*Spiraea*).

194. *Egira hiemalis*

Wingspan 3.5 cm. Forewing is mottled gray with a red reniform spot and other red shades; hindwing is pale gray. This noctuid is common in wet conifer forests in the Pacific West. Moths fly in late winter and early spring. Caterpillars feed on the foliage of hazelnut (*Corylus cornuta*) and ash (*Fraxinus*).

Similar species: ***Egira variabilis*** forewing with similar colors but without the mottled shades, common in the southern Rocky Mountains and Southwest, extending to California and southwest Oregon, caterpillars feed on the foliage of pine (*Pinus*); ***Egira dolosa*** forewing mottled gray to black without shades of red, common in the Rocky Mountain region, caterpillars feed on quaking aspen (*Populus tremuloides*); ***Egira curialis*** forewing is elongate and pale gray, hindwing white, common and widely distributed in dry forests, caterpillars feed on hackberry (*Celtis reticulata*) and chokecherry (*Prunus virginiana*).

195. *Egira rubrica*

Wingspan 3.4 cm. Forewing is brown to pale yellow, often with a black subapical band; hindwing is white. This noctuid is abundant and widely distributed in wet conifer forests west of the Cascade Mountains but more restricted to riparian forests at low elevations east of the Cascade Mountains. Moths fly in early spring. Caterpillars feed on the foliage of ocean spray (*Holodiscus discolor*), deerbrush (*Ceanothus integerrimus*), and snowbrush (*Ceanothus velutinus*).

Similar species: ***Egira perlubens*** forewing is dark gray to black with a pale orbicular spot, widely distributed in western North America.

196. *Homorthodes communis*

Wingspan 2.7 cm. Forewing is pale yellow to red-brown with fine markings. This noctuid is abundant in the Pacific West and widely distributed in the Pacific Northwest. Moths fly in late summer. Caterpillars feed on the foliage of alder (*Alnus*).

Similar species: This moth represents a large complex of some 15 species in the noctuid genera ***Anhimella***, ***Homorthodes***, ***Protorthodes***, and ***Pseudorthodes*** which are characterized by small size and yellow, gray or red color; ***Protorthodes curtica*** forewing red with a black reniform spot, common in ponderosa pine forests; ***Pseudorthodes irrorata*** forewing is red with a small white reniform spot, common in wet coastal forests.

197. *Zosteropoda hirtipes*

Wingspan 2.7 cm. Forewing is yellow to orange with thin, black v-shaped basal and postmedian lines. This noctuid is abundant in wet coastal forests, but occurs into the Rocky Mountain region. Moths fly in midsummer. Caterpillars feed on the foliage of clover (*Trifolium*), and *Aster*.

198. *Agrotis venerabilis*

Wingspan 4.0 cm. Forewing is pale gray-brown streaked with black-brown and with a long black basal dash, reniform spot greatly enlarged, and the orbicular spot absent. This noctuid is common and widely distributed in ponderosa pine forests and juniper woodlands in western North America. Moths fly in late summer and fall. Caterpillars feed on herbs as subsurface cutworms.

Similar species: ***Agrotis ipsilon*** is a migratory pest species that is often abundant in late summer, larger, forewing elongate and black-brown with a pale submarginal border and greatly reduced discal spots, caterpillars feed on herbs as subsurface cutworms.

199. *Agrotis vancouverensis*

Wingspan 3.7 cm. Forewing is light red-brown to dark brown with well-developed reniform and orbicular spots; a long black basal dash may be present. This noctuid is widely distributed in wet conifer forests of the Pacific Northwest and is particularly common west of the Cascade Mountains. Moths fly in late spring and early summer. Caterpillars feed on herbs as subsurface cutworms.

Similar species: ***Agrotis obliqua*** forewing brown with a black costal margin, widely distributed in wet conifer forests at higher elevations in western North America.

200. *Euxoa vetusta*

Wingspan 4.2 cm. Forewing is white to dark gray with large discal spots; hindwing is dark brown; males have pectinate antennae. This noctuid is endemic to wet coastal forests. Moths fly in early to midsummer. Caterpillars feed on herbaceous plants.

201. *Euxoa satis*

Wingspan 3.6 cm. Forewing is dark brown to black with large discal spots; hindwing is dark brown. This noctuid is abundant and widely distributed in wet conifer forests in western North America. Moths fly in late summer. Caterpillars feed on herbs at the soil surface.

Similar species: ***Euxoa satis*** represents a large group of over 40 species with similar gray, brown, and black colors, many species may occur at a single locality in dry forests east of the Cascade Mountains; ***Aseptis fumosa*** **(140)** possess small erect tufts of hair on the dorsum of the abdomen.

202. *Euxoa auripennis*

Wingspan 3.6 cm. Forewing is contrasting black and lavender with large discal spots. This noctuid is common and widely distributed in western North America occurring in ponderosa pine and juniper-pinyon pine forests. Moths fly in late summer. Caterpillars feed on herbs at the soil surface.

Similar species: ***Euxoa costata*** forewing is red with a white costal margin and white discal spots, abundant in ponderosa pine forests east of the Cascade Mountains; ***Euxoa basalis*** forewing is red with a white basal patch instead of the white costal margin, abundant in the Rocky Mountain region.

203. *Pseudorthosia variabilis*

Wingspan 3.8 cm. Forewing is pale yellow to orange with a narrow black reniform spot; hindwing is white. This noctuid is abundant and widely distributed in dry forests, particularly ponderosa pine forests east of the Cascade Mountains. Moths fly in late summer. Caterpillars feed on the foliage of herbs.

Similar species: ***Crassivesica bocha*** (Noctuidae) forewing is pale pink to lavender with a large black reniform spot and mottled with fine dark lines, costal margin is black.

204. *Diarsia esurialis*

Wingspan 3.3 cm. Forewing is yellow, orange, or pink-lavender, often with the discal cell black between the discal spots. This noctuid is endemic but abundant in wet coastal forests in the Pacific West. Moths fly in midsummer. Caterpillars feed on the foliage of hazelnut (*Corylus*) and alders (*Alnus*).

Similar species: ***Diarsia rosaria*** forewing is red-brown, abundant and widely distributed in wet conifer forests of western North America, caterpillars feed on grasses; ***Ochropleura implecta*** (Noctuidae) forewing is red-brown but with a white costal margin, hindwing white, widely distributed but particularly abundant in wet coastal forests, caterpillars feed on herbs and willow (*Salix*); ***Xestia smithii*** (Noctuidae) forewing without a black discal cell between the discal spots, common in wet conifer forests, caterpillars feed on both herbs and the foliage of flowering trees and shrubs; ***Paradiarsia littoralis*** (Noctuidae) forewing is yellow to pale brown, hindwing black, male antennae pectinate, abundant in the Rocky Mountains, caterpillars feed on herbs.

205. *Cerastis enigmatica*

Wingspan 3.3 cm. Forewing is dark red-brown with a pale red submarginal border, orbicular and reniform spots fused together to form a large, red-colored, "v" shaped spot; thoracic collar pale yellow. This noctuid is endemic and abundant in wet coastal forests of the Pacific Northwest. Moths fly in early spring. Caterpillars feed on the foliage of salmonberry (*Rubus spectabilis*).

Similar species: ***Cerastis gloriosa*** is larger, forewing with fused white discal spots, uncommon and occurs in wet coastal forests of the Pacific Northwest; species of ***Stretchia***, such as ***Stretchia muricina*** **(185)**, lack the yellow thoracic collar and males have strongly pectinate antennae.

206. *Anaplectoides pressus*

Wingspan 4.1 cm. Forewing is gray or green with black shades; hindwing is pale gray to white. This noctuid is common and widely distributed in western North America, particularly in wet conifer forests. Moths fly in midsummer. Caterpillars feed on the foliage of herbs.

Similar species: ***Anaplectoides prasina*** is larger, forewing with a large white subapical spot adjacent to the reniform spot, hindwing dark brown, widely distributed in wet conifer forests, caterpillars feed on the foliage of species of *Rubus* and *Vaccinium*; ***Aplectoides condita*** (Noctuidae) forewing is black with large white discal spots and a red-brown submarginal border, occurs in high elevation conifer forests of the Cascade Mountains and northern Rocky Mountains, caterpillars feed on the foliage of conifers; ***Xestia mustelina*** **(210)** forewing is pink-gray with large, gray discal spots.

207. *Spaelotis bicava*

Wingspan 3.7 cm. Forewing is gray with the small orbicular spot elongate and outlined in black. This noctuid is abundant and widely distributed in dry forests of western North America. Moths fly in midsummer. Caterpillar host plants are shrubs such as sage (*Artemisia*).

Similar species: ***Spaelotis clandestina*** forewing is dark gray-black, common in the Rocky Mountain region; ***Graphiphora augur*** (Noctuidae) forewing with the reniform and orbicular spots outlined in black, widely distributed in wet conifer forests, caterpillars feed on flowering trees and shrubs such as willow (*Salix*); ***Rhyacia clemens*** (Noctuidae) forewing with a black area between the discal spots, distinct basal and postmedian lines, widely distributed in dry forests.

208. *Eurois astricta*

Wingspan 5.3 cm. Forewing is mottled dark black-brown with large discal spots; hindwing is solid dark gray to black. This noctuid is common and widely distributed in high elevation conifer forests of western North America, especially abundant in the Pacific Northwest. Moths fly in midsummer. Caterpillars feed on the foliage of poplar (*Populus*).

Similar species: ***Eurois nigra*** hindwing is pale gray with a white submarginal border, widely distributed and abundant in the Rocky Mountains, caterpillar host plant unknown; ***Eurois occulta*** is larger, forewing mottled gray and black with a white orbicular spot, hindwing black with a prominent white fringe of hairs on the wing margin, widely distributed in high elevation conifer forests, caterpillars feed on the foliage of many flowering trees and shrubs such as willow (*Salix*), poplar (*Populus*), and alder (*Alnus*), and on larch (*Larix*).

209. *Xestia oblata*

Wingspan 3.8 cm. Forewing is pink-orange to purple with an orange-purple submarginal border, discal spots large and the discal cell black between the discal spots; hindwing is yellow. This noctuid is common and widely distributed in western North America, particularly common in the Rocky Mountain region. Moths fly in midsummer. Caterpillar host plants in the Pacific Northwest are unknown.

Similar species: ***Agnorisma bugrai*** (Noctuidae) forewing is purple-gray with thin, pale basal and postmedian lines, common in ponderosa pine forests east of the Cascade Mountains; ***Pseudohermonassa flavotincta*** (Noctuidae) forewing is pale yellow to brown, streaked with thin black lines and a yellow costal margin, a rare species endemic to wet coastal forests, caterpillars feed on grasses.

210. *Xestia mustelina*

Wingspan 3.6 cm. Forewing is pink-gray with very large gray discal spots outlined in black. This noctuid is common and widely distributed in wet conifer forests in the Pacific West and in the northern Rocky Mountains. Moths fly in late summer. Caterpillars feed on the foliage of species of Pinaceae, in particular Douglas-fir (*Pseudotsuga menziesii*) and western hemlock (*Tsuga heterophylla*) and flowering trees and shrubs such as madrone (*Arbutus menziesii*), myrica (*Myrica*), and huckleberry (*Vaccinium*).

Similar species: ***Anaplectoides pressus*** **(206)** forewing is pale gray-green with small discal spots.

211. *Xestia finatimis*

Wingspan 3.7 cm. Forewing is pale gray or gray-brown with a black basal dash, an elongate orbicular spot and a small reniform spot. This noctuid is common and widely distributed in dry forests in the Pacific West. Moths fly in mid to late summer. Caterpillar host plant unknown.

Similar species: ***Xestia vernilis*** is similar in appearance and is differentiated by characteristics of the genitalia and distribution, widely distributed in the Rocky Mountain region; ***Xestia infimatis*** forewing is pale brown to black-brown, common in both wet conifer and dry forests in the Pacific West, caterpillars are generalist feeders on the foliage of flowering trees and shrubs.

212. *Tesagrotis atrifrons*

Wingspan 3.6 cm. Forewing is pale pink-red to dark red-brown with weak basal and postmedian lines; hindwing is white with a darker border; head is yellow with a narrow black line crossing the prothoracic collar. This noctuid is common and widely distributed in dry forests, particularly common in ponderosa pine forests. Moths fly in midsummer. Caterpillars feed on the foliage of bitterbrush (*Purshia tridentata*).

Similar species: ***Tesagrotis piscipellis*** head is red, without a black prothoracic line; ***Tesagrotis corrodera*** forewing is red-brown and streaked with yellow; ***Setagrotis pallidicollis*** (Noctuidae) forewing is pale gray with red, orbicular spot large and elongate, common in dry forests in the Pacific Northwest, caterpillars feed on the foliage of flowering trees and shrubs; ***Setagrotis vocalis*** forewing is gray and occurs in the Rocky Mountains, Great Basin and Southwest.

213. *Adelphagrotis stellaris*

Wingspan 3.6 cm. Forewing is light gray to brown with a pale yellow or red reniform spot. This noctuid is common and endemic to wet coastal forests in the Pacific West. Moths fly in midsummer. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs such as dogwood (*Cornus*), ocean spray (*Holodiscus discolor*), snowbrush (*Ceanothus velutinus*), ninebark (*Physocarpus capitatus*), and buckthorn (*Rhamnus purshiana*).

Similar species: ***Adelphagrotis indeterminata*** forewing is dark gray with a black basal dash, thoracic collar black, widely distributed in the Pacific West, and the caterpillars feed on flowering trees and shrubs; ***Protolampra rufipectus*** (Noctuidae) forewing is light purple-gray without a yellow reniform spot and with a dark brown thoracic collar, widely distributed in dry forests of western North America, caterpillars feed on the foliage of flowering trees and shrubs.

214. *Abagrotis trigona*

Wingspan 3.4 cm. Forewing is pale yellow to black-brown with a narrow black reniform spot; hindwing is black. This noctuid is widely distributed in western North America. Moths fly in late summer. Caterpillars feed on the foliage of huckleberry (*Vaccinium*).

Similar species: ***Abagrotis trigona*** represents a group of at least eight species (other than those listed below) that are quite similar in coloration and difficult to distinguish, all widely distributed, caterpillars feed on flowering trees and shrubs.

215. *Abagrotis glenni*

Wingspan 3.4 cm. Forewing is pale gray-brown with a large white reniform spot and black basal and discal streaks. This noctuid is common and widely distributed in juniper woodlands in western North America. Moths fly in late summer. Caterpillars feed on the foliage of juniper (*Juniperus*) and western red cedar (*Thuja plicata*).

Similar species: ***Abagrotis mirabilis*** forewing is black with a large white reniform spot, widely distributed in western North America, caterpillars feed on junipers and cedars; ***Abagrotis rubicundis*** forewing is dark red, restricted to the mountains of California and southwestern Oregon.

216. *Abagrotis pulchrata*

Wingspan 3.6 cm. Forewing is dark red-brown with bands of pale gray. This noctuid is common but has a limited distribution in forests in the Pacific West from Vancouver Island to central California. This species was once regarded as rare but we have found it to be abundant in western Oregon, particularly in the Siskiyou Mountains. Moths fly in late summer. Caterpillars feed on the foliage of maple (*Acer*), alder (*Alnus*), hazelnut (*Corylus*), and willow (*Salix*).

Similar species: ***Abagrotis scopeops*** forewing is black-brown to red-brown with a gray submarginal border and discal spots strongly outlined in gray, widely distributed in western North America, especially in dry forests; ***Abagrotis variata*** forewing is black-brown to red-brown with a gray submarginal border but the discal spots are obscure, widely distributed in riparian habitats in western North America, caterpillars feed on the foliage of flowering trees and shrubs, particularly willow.

217. *Parabagrotis exertistigma*

Wingspan 3.9 cm. Forewing is gray to black with a yellow costal margin and a pear-shaped orbicular spot connected to the costal margin. This noctuid is abundant and widely distributed in western North America. Moths fly in late summer. Caterpillars feed on herbs and grasses.

Similar species: three additional species of ***Parabagrotis*** are abundant in the Pacific Northwest; ***Parabagrotis sulinaris*** is larger, forewing is pale yellow, red, or dark red-brown; ***Parabagrotis insularis*** is smaller, forewing is dark black or red and lacks a yellow costal margin; ***Parabagrotis formalis*** forewing is pale gray or red-brown with an elongate orbicular spot and a broad black prothoracic collar; species of ***Euxoa*** **(200-202)** are similar in appearance but lack the pear-shaped orbicular spot of ***Parabagrotis***.

218. *Schinia walsinghami*

Wingspan 2.8 cm. Forewing is light to dark red-brown with wavy white basal and postmedian lines. This noctuid is abundant in ponderosa pine forests and juniper woodlands. Moths fly in late summer. The caterpillar host plant is unknown.

Similar species: the genus ***Schinia*** consists of many species most of which are found in grasslands and semidesert rangelands; ***Schinia unimacula*** forewing is mostly white with dark basal, reniform and subapical spots, abundant in juniper woodlands east of the Cascade Mountains; ***Schinia separata*** is larger, wings with black and white bands, abundant in juniper woodlands east of the Cascade Mountains.

NOTODONTIDAE

219. *Clostera apicalis*

Wingspan 3.1 cm. Forewing is gray with a dark red-gray subapical patch that is not clearly delineated and with narrow white longitudinal lines including a central diagonal white line. This notodontid is common and widely distributed in western North America. Moths fly from late spring to late summer. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs, often found on willow (*Salix*).

Similar species: ***Clostera albosigma*** is larger, forewing with a well delineated subapical patch and the central white lines are not at a diagonal, uncommon in the Pacific West but common in the Rocky Mountains.

220. *Nadata gibbosa*

Wingspan 5.6 cm. Forewing is yellow with brown-tan shading, an orange discal cell, a small white reniform spot, and narrow dark basal and postmedian lines. This notodontid is common in oak woodlands and widely distributed in western North America. Moths fly from late spring to late summer. Caterpillars feed on the foliage of a few flowering trees and shrubs, particularly oak (*Quercus*).

Similar species: ***Nadata oregonensis*** forewing is a pale brown with darker brown shading, pale brown discal cell, and dark brown submarginal veins, moths are common in the Pacific West, caterpillars feed on foliage of oak; ***Datana ministra*** (Notodontidae) forewing is light red-brown with narrow dark longitudinal lines, thorax is dark red-brown, widely distributed but not common in the Pacific Northwest, caterpillars are generalist feeders on the foliage of flowering trees.

221. *Pheosia portlandia*

Wingspan 6.5 cm. Forewing is red-brown with a gray discal cell, narrow white postmedian line, long black postmedian dashes, a black basal dash, and a black hair tuft in the center of the inner wing margin. This notodontid is common in wet coastal forests. Moths fly from spring to fall. Caterpillars feed on the foliage of willow (*Salix*), aspen, and poplar (*Populus*).

Similar species: ***Pheosia rimosa*** forewing is white with a black band along the inner margin and a black subapical patch, widely distributed but particularly common in the Rocky Mountains, caterpillars feed on foliage of willow (*Salix*) and poplar (*Populus*).

222. *Notodonta pacifica*

Wingspan 4.4 cm. Forewing is a light red-brown with a gray discal area, obscure markings, and a black hair tuft in the center of the inner margin; hindwing is pale gray. This notodontid is rare, endemic to the Pacific West. Moths fly in spring. Caterpillar host plants are unknown.

Similar species: ***Notodonta scitipennis*** forewing with distinct markings, hindwing white, occurs in the southern Rocky Mountain region, caterpillars feed on the foliage of willow (*Salix*) and poplar (*Populus*); ***Odontosia elegans*** (Notodontidae) forewing black-gray with a large marginal hair tuft, hindwing white with a gray anal margin, occurs in the southern Rocky Mountain region, caterpillars feed on foliage of poplars.

223. *Gluphisia septentrionis*

Wingspan 3.3 cm. Forewing is gray with fine dark longitudinal lines and a broad pale yellow to orange median band. This notodontid is common and widely distributed in western North America. Moths fly from late spring to midsummer. Caterpillars feed on the foliage of willow (*Salix*) and poplar (*Populus*).

Similar species: ***Gluphisia severa* (224)** is larger, forewing mottled dark gray to black-gray; species of ***Dasychira* (22-23)** forewing with a white subanal spot or white median patches on the forewing.

224. *Gluphisia severa*

Wingspan 4.4 cm. Forewing is a mottled dark gray to black-gray with fine dark longitudinal lines. This notodontid is common in wet forests and widely distributed in western North America. Moths fly from early spring to early summer. Caterpillars feed on the foliage of willows (*Salix*) and poplars (*Populus*).

Similar species: ***Gluphisia septentrionis* (223)** is smaller, forewing with a yellow to orange median band; ***Heterocampa lunata*** (Notodontidae) is larger, forewing is dark gray with few markings, hindwing white to pale gray, occurs in the Rocky Mountains; species of ***Dasychira* (22-23)** forewing with a white subanal spot or white median patches on the forewing.

225. *Furcula scolopendrina*

Wingspan 3.5 cm. Forewing is elongate and white with black bands and fine black spots along the wing margin. This notodontid is common in wet forests and widely distributed in western North America. Moths fly from late spring to late summer. Caterpillars feed on the foliage of willow (*Salix*) and poplar (*Populus*).

Similar species: ***Furcula cinerea*** forewing pale gray with obscure dark bands, moths are widely distributed, caterpillars feed on foliage of willow and poplar.

226. *Schizura ipomoeae*

Wingspan 4.5 cm. Forewing is a mottled brown and pale gray with a small pale reniform spot, narrow dentate basal and postmedian lines, and black marginal dashes; hindwing is white in males and brown in females. This notodontid is common and widely distributed in western North America. Moths fly from late spring to late summer. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs such as cherry (*Prunus*), oak (*Quercus*), apple (*Malus*), maple (*Acer*), and alder (*Alnus*), and are occasional pests in orchards.

227. *Schizura unicornis*

Wingspan 3.5 cm. Forewing is pale pink and gray with a small black reniform spot, a broad yellow subapical patch, and small black subapical dashes. This notodontid is common and widely distributed in western North America. Moths fly from late spring to late summer. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs such as cherry (*Prunus*), apple (*Malus*), hawthorn (*Crataegus*), oak (*Quercus*), and dogwood (*Cornus*), and are occasional pests in orchards.

Similar species: ***Oligocentria semirufescens* (229)** is larger, forewing with dark gray median and submarginal patches and a white apical patch.

228. *Schizura concinna*

Wingspan 3.5 cm. Forewing is pale yellow with shades of lavender and few markings except for a dark purple band across the inner margin; hindwing is white in males and brown in females. Adults of this notodontid are not as commonly collected relative to the common presence of caterpillars, widely distributed in western North America. Moths fly in midsummer. Caterpillars are known as the red-humped caterpillar and are generalist feeders on the foliage of flowering trees and shrubs, often found on oak (*Quercus*), snowbrush (*Ceanothus velutinus*), aspen (*Populus*), cherry (*Prunus*), and willow (*Salix*).

229. *Oligocentria semirufescens*

Wingspan 4.2 cm. Forewing is pale gray and pink with dark gray median and submarginal patches, a white apical patch, and pale brown hindwing. This notodontid is common in wet forests and widely distributed in western North America. Moths fly in midsummer. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs, such as, willow (*Salix*), poplar (*Populus*), maple (*Acer*), and alder (*Alnus*).

Similar species: ***Schizura unicornis* (227)** is smaller, forewing with a broad yellow subapical patch and small black subapical dashes.

230. *Oligocentria pallida*

Wingspan 4.7 cm. Forewing is pale yellow with a gray costal margin, black apical dashes, and a narrow black reniform spot; hindwing is yellow in males and gray in females. This notodontid is common and widely distributed in western North America. Moths fly in midsummer. Caterpillars feed on the foliage of willow (*Salix*), apple (*Malus*), maple (*Acer*), and poplar (*Populus*).

SATURNIIDAE

231. *Coloradia pandora*

Wingspan 8.1 cm. Forewing is black-brown with gray scales, basal and postmedian lines are black and jagged to dentate, reniform spot is small, black, and round; hindwing is pink with a round, black reniform spot and black postmedian line and submarginal border. This saturniid is known as the pandora moth and is widely distributed in western North America, particularly abundant in ponderosa pine forests. Moths fly in midsummer. Caterpillars feed on the foliage of species of Pinaceae, especially pine (*Pinus*), and are often forest pests.

Similar species: ***Coloradia doris*** is smaller, reniform spots very small and narrow, widely distributed in the Rocky Mountains, the caterpillars feed on the foliage of pine (*Pinus*); ***Coloradia luski*** forewing with an elongate jagged basal line that touches the reniform spot, occurs in the southern Rocky Mountains.

232. *Hemileuca eglanterina*

Wingspan 6.4 cm. Forewing is rose-pink and orange with black basal and postmedian bands, a round reniform spot and submarginal dashes; hindwing is orange with a similar pattern of black as on the forewing; abdomen orange with black bands. Color variants may lack all black markings, with pure unmarked rose and orange wings (top photo), or the black markings may be distinct (bottom photo) or greatly enlarged over most of the wing. This saturniid is common and widely distributed in western North America. Moths fly during the day in midsummer. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs, particularly Rosaceae such as rose (*Rosa*), hawthorn (*Crataegus*), cherry (*Prunus*), serviceberry (*Amelanchier alnifolia*), and bitterbrush (*Purshia tridentata*).

Similar species: ***Hemileuca nuttalli*** forewing is yellow, hindwing with a v-shaped black postmedian band, widely distributed in dry forests east of the Cascade Mountains, caterpillars feed on bitterbrush; ***Hemileuca hera*** wings are white with comma-shaped black reniform spots, widely distributed in juniper woodlands and sagebrush steppes, caterpillars feed on sagebrush (*Artemisia tridentata*); ***Hemileuca nevadensis*** wings are black with a broad white median band, occurs in wet forests and riparian habitats east of the Cascade Mountains, moths fly in fall and caterpillars feed on foliage of willow (*Salix*) and poplar (*Populus*).

233. *Saturnia mendocino*

Wingspan 6.5 cm. Forewing is dark brown with a round black reniform spot; hindwing is yellow-orange with a black postmedian band and round reniform spot. This saturniid is rare in the northern reaches of its range and occurs in dry forests of California and western Oregon. Moths fly during the day in spring. Caterpillars feed on the foliage of manzanita (*Arctostaphylos*), madrone (*Arbutus menziesii*), and species of *Ceanothus*.

Similar species: ***Saturnia albofasciata*** forewing with a white median band, restricted to California, moths fly in fall, caterpillars feed on the foliage of *Ceanothus*.

234. *Antheraea polyphemus*

Wingspan 12.2 cm. Forewing is brown with pink edges to the basal and submarginal lines, reniform spot is round and translucent, apical spot is small and black; hindwing with a broad black submarginal line and a large black, blue, and yellow discal eyespot. This saturniid is known as the polyphemus moth and is common and widely distributed in wet forests of western North America. Moths fly in late spring and early summer. Caterpillars are generalist feeders on flowering trees, particularly maple (*Acer*) and oak (*Quercus*).

235. *Hyalophora euryalus*

Wingspan 10.3 cm. Forewing is variable rose-red, purple-red or dark red-brown with a large white, comma-shaped reniform spot, white basal and postmedian lines, and a round black subapical spot; hindwing is similar with an extremely elongate reniform spot. This saturniid is common and widely distributed in the Pacific Northwest. Moths fly in spring. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs, particularly snowbrush (*Ceanothus velutinus*) and bitterbrush (*Purshia tridentata*) and the foliage of some conifers, sometimes found on Douglas-fir (*Pseudotsuga menziesii*).

Similar species: ***Hyalophora gloveri*** hindwing with a short reniform spot and broader basal and postmedian lines, occurs in the Southwest, Great Basin and Rocky Mountains. Hybrid populations of ***H. euryalus*** and ***H. gloveri*** occur in the northern Rocky Mountains.

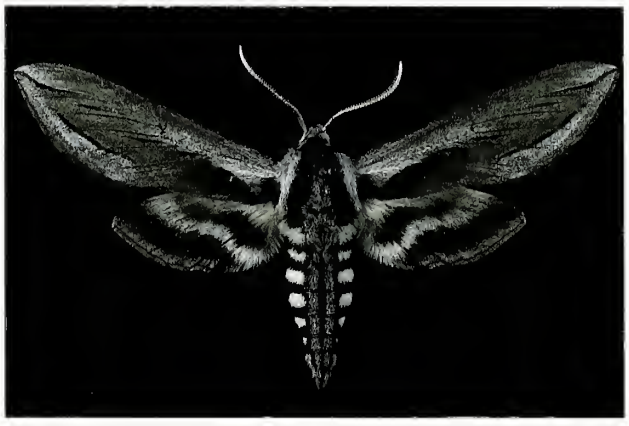
SPHINGIDAE

236. *Sphinx chersis*

Wingspan 8.8 cm. Forewing is pale gray with narrow black streaks; hindwing is pale gray with black median and submarginal bands; thorax is gray with two narrow black lines; abdomen with black and pale gray lateral spots. This sphingid is common and widely distributed in western North America. Moths fly in spring and early summer. Caterpillars are generalist feeders on the foliage of flowering trees and shrubs, such as cherry (*Prunus*), aspen (*Populus*), and ash (*Fraxinus*).

Similar species: ***Sphinx vashti*** **(237)** forewing with a black postmedian line and a black basal patch; ***Sphinx sequoiae*** **(239)** is smaller, hindwing is brown without black bands.

237. *Sphinx vashti*



Wingspan 8.2 cm. Forewing is dark gray with a black basal area, a pale gray discal area and a black postmedian line; hindwing is white with black median and submarginal bands; thorax is black to gray; abdomen with black and white lateral spots. This sphingid is abundant in wet forests in much of western North America. Moths fly in spring and early summer. Caterpillars feed on the foliage of snowberry (*Symphoricarpos albus*).

Similar species: ***Sphinx perelegans*** **(238)** is larger, forewing without a black postmedian line, caterpillars feed on the foliage of species of *Ceanothus*; ***Sphinx sequoiae*** **(239)** is smaller, hindwing is gray, caterpillars feed on the foliage of juniper (*Juniperus*).

238. *Sphinx perelegans*

Wingspan 9.1 cm. Forewing is dark black-gray with a pale gray discal area, narrow black streaks, and a pale gray submarginal line; hindwing is pale gray with black median and submarginal bands; thorax mostly black; abdomen with black and white lateral spots. This sphingid is abundant in dry forests in the Pacific West. Moths fly in spring and early summer. Caterpillars feed on the foliage of species of *Ceanothus*.

Similar species: ***Sphinx drupiferarum*** forewing is black with a contrasting white discal area, widely distributed in western North America, caterpillars feed on the foliage of cherry (*Prunus*) and apple (*Malus*); ***Sphinx vashti*** **(237)** is smaller, forewing with a black postmedian line, caterpillars feed on the foliage of snowberry (*Symphoricarpos albus*).

239. *Sphinx sequoiae*

Wingspan 5.0. Forewing is gray with narrow black lines; hindwing is solid gray without markings; thorax is gray with two narrow black lines; abdomen with black and gray lateral spots. This sphingid is widely distributed in dry forests with cedars in the Pacific West and is particularly abundant in juniper woodlands east of the Cascade Mountains. Moths fly in midsummer. Caterpillars feed on the foliage of western red cedar (*Thuja plicata*) and juniper (*Juniperus*).

Similar species: ***Sphinx dollii*** occurs in the Southwest and southern Rocky Mountains, caterpillars feed on juniper; ***Sphinx vashti*** **(237)** is larger, hindwing with a black band, caterpillars feed on the foliage of snowberry (*Symphoricarpos albus*).

240. *Smerinthus cerisyi*

Wingspan 7.8 cm. Forewing is falcate, pale gray with darker red or black-brown lines and bands, the outer margin not scalloped; hindwing is rose-red with a blue ring on a round black anal spot. This sphingid is abundant in wet forests in western North America, particularly in coastal forests, riparian forests east of the Cascade Mountains, and quaking aspen forests of the Rocky Mountains. Moths fly in spring and early summer. Caterpillars feed on the foliage of willow (*Salix*) and poplar (*Populus*).

Similar species: species of ***Paonias*** **(241, 242)** hindwing with a solid blue pupil on the black anal spot; species of ***Pachysphinx*** **(243)** hindwing with a black anal bar.

241. *Paonias excaecatus*

Wingspan 7.8 cm. Forewing is pale to dark brown with the outer margin scalloped; hindwing is rose-red with a round black anal spot having a solid blue pupil. This sphingid is common and widely distributed in dry forests west of the Cascade Mountains and in riparian forests east of the Cascades. Moths fly in late spring to midsummer. Caterpillars feed on the foliage of flowering trees and shrubs, such as, hawthorn (*Crataegus*), birch (*Betula*), poplar (*Populus*), and serviceberry (*Amelanchier alnifolia*).

Similar species: ***Paonias myops*** **(242)** forewing lacks the scalloped wing margin, hindwing is yellow; species of ***Smerinthus*** **(240)** hindwing with a blue ring on the black anal spot; species of ***Pachysphinx*** **(243)** hindwing with a black anal bar.

242. *Paonias myops*

Wingspan 6.1 cm. Forewing is red-brown, falcate, the margin not scalloped; hindwing is yellow with a round black anal spot having a solid blue pupil. This sphingid is widely distributed in western North America east of the Cascades. Moths fly in late spring and early summer. Caterpillars feed on the foliage of cherry (*Prunus*) and serviceberry (*Amelanchier alnifolia*).

Similar species: ***Paonias excaecatus*** **(241)** is larger, forewing with a scalloped margin, hindwing rose-red; species of ***Smerinthus*** **(240)** hindwing with a blue ring on the black anal spot.

243. *Pachysphinx modesta*

Wingspan 14.1 cm. Forewing is pale gray with a dark gray median band and the outer margin scalloped; hindwing is rose-red with a black and gray anal bar or patch. This sphingid is most often found in riparian forests at higher elevations in the mountains and is widely distributed in western North America. Moths fly in late spring and early summer. Caterpillars feed on the foliage of willow (*Salix*) and poplar (*Populus*).

Similar species: ***Pachysphinx occidentalis*** forewing is pale yellow or gray, hindwing with a narrow black anal bar, occurs in riparian habitats in low elevation desert regions of western North America; species of ***Paonias*** **(241-242)** and ***Smerinthus*** **(240)** hindwing with a round black anal spot.

244. *Hemaris diffinis*

Wingspan 3.7 cm. Forewing is mostly clear of scales except for narrow black basal and marginal bands; thorax yellow; abdomen black and yellow banded. This sphingid is widely distributed in western North America. Moths fly during the day in spring and early summer. Caterpillars feed mainly on the foliage of snowberry (*Symphoricarpos albus*) and honeysuckle (*Lonicera*).

245. *Proserpinus clarkiae*

Wingspan 3.8 cm. Forewing is pale green with a dark green median band; hindwing is orange with a black marginal border. This sphingid is widely distributed in dry forests at lower elevations in western North America. Moths fly during the day in spring. Caterpillars feed on Onagraceae, particularly on the foliage of *Clarkia*.

Similar species: ***Proserpinus flavofasciata*** is a bumblebee mimic, forewing is black with a white postmedian band, hindwing yellow with black basal and marginal borders, head and thorax yellow, abdomen black, uncommon but widely distributed in the Cascades and Rocky Mountains, moths fly during the day in early spring, caterpillars feed on foliage of fireweed (*Epilobium*); ***Arctonotus lucidus*** (Sphingidae) forewing is green with purple basal and postmedian bands, hindwing pink with a dark red submarginal band, widely distributed in dry forests of Idaho, Washington, Oregon, and California, moths fly in late winter and early spring, caterpillars feed on the foliage of evening primrose (*Oenothera*).

246. *Hyles lineata*

Wingspan 8.8 cm. Forewing is black with a central cream-yellow stripe that extends from base to apex and white wing veins; hindwing is rose-pink with black basal and marginal bands; thorax brown with white streaks. This sphingid is known as the white-lined sphinx and is abundant and widely distributed in western North America. Moths fly during the day and at night in late spring to late summer. Caterpillars are typically found feeding on foliage of Onagraceae and in western forests are common on fireweed (*Epilobium*).

Similar species: ***Hyles gallii*** forewing without white wing veins and white streaks on the thorax, restricted to high elevation habitats, caterpillars feed on fireweed.

THYATIRIDAE

247. *Habrosyne scripta*

Wingspan 3.8 cm. Forewing is gray-brown with pink basal and submarginal lines and a zig-zag postmedian line; hindwing is pale brown. This thyatirid is particularly abundant in wet coastal forests and widely distributed in western North America. Moths fly from midsummer to fall. Caterpillars are generalist feeders on the foliage of flowering shrubs, often found on species of *Rubus*.

Similar species: ***Habrosyne gloriosa*** forewing with basal line bent at a sharp right angle, hindwing is dark gray-brown, occurs in the southern Rocky Mountain region.

248. *Pseudothyatira cymatophoroides*

Wingspan 4.2 cm. Forewing is angular, pale gray-brown with narrow dentate basal, postmedian, and submarginal lines, some moths with a black basal band and subanal spot. This thyatirid is abundant in wet coastal forests. Moths fly from late spring to late summer. Caterpillars are generalist feeders on the foliage of flowering shrubs, often found on species of *Rubus*.

249. *Euthyatira lorata*

Wingspan 4.4 cm. Forewing is gray with black markings and white basal, median, and apical patches; hindwing is brown with faint dark bands. This thyatirid is common in wet coastal forests. Moths fly in spring to early summer. Caterpillars feed on the foliage of dogwood (*Cornus*).

Similar species: ***Euthyatira pudens*** forewing with pink basal, median, and apical patches, occurs in wet forests of the Rocky Mountain region.

250. *Euthyatira semicircularis*

Wingspan 4.3 cm. Forewing is gray with narrow rounded black basal and postmedian lines and white basal and apical patches. This thyatirid is common and widely distributed in wet conifer forests of western North America. Moths fly in early summer. Caterpillar host plants are unknown.

251. *Ceranemota tearlei*

Wingspan 3.9 cm. Forewing is pale gray with narrow black basal and postmedian lines and darker gray basal and postmedian bands. This thyatirid is common in wet conifer forests east of the Cascade Mountains. Moths fly in fall. Caterpillars feed on the foliage of willow (*Salix*), serviceberry (*Amelanchier alnifolia*), and mountain ash (*Sorbus scopulina*).

Similar species: ***Ceranemota improvisa*** forewing with median band pale gray to white, basal and postmedian bands are black to dark gray-brown; ***Ceranemota fasciata*** forewing with median band broad and white, postmedian lines are pink and black, basal and postmedian bands are pale gray; ***Ceranemota crumbi*** forewing is solid dark gray with obscure basal and postmedian lines. These three species occur in wet conifer forests west of the Cascade Mountains and they fly in fall.

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Index to Scientific Names

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Glossary

abdomen - One of the three primary body segments, along with the head and thorax, characteristic of insects. The abdomen in moths is typically elongate and contains the reproductive organs.

anal angle - the angle along the edge of the wing created by the transition from the outer margin to the inner margin.

anal area - see area, anal.

antennae - (singular: antenna) variously shaped filamentous sensory organs located on the top of the head.

apical area - see area, apical.

area, anal - the area on the wing between the outer margin and the inner margin, proximal to the anal angle.

area, apical - the area on the wing below the apex.

area, basal - the area at the base of the wing where the wing is attached to the thorax.

area, discal - the area of the wing containing and immediately adjacent to the discal cell.

area, median - the central area of the wing.

area, midcostal - the area in the center of the front edge of the wing.

area, postmedian - the area on the wing immediately distal to the median area and proximal to the submarginal area.

area, subanal - the area on the wing proximal to the anal area.

area, subapical - the area on the wing proximal to the apical area.

area, submarginal - the area on the wing proximal to the outer margin.

band - a wide area typically extending more than half the distance along the width or length of the wing and often demarked by lines and associated with a particular area on the wing.

band, inner - a wide area near the base of the wing demarked by lines extending the width of the wing.

bar - a narrow, short mark on the wing; a very short dash.

basal area - see area, basal.

basal line - see line, basal.

butterfly - the adult of a species of Lepidoptera with knobbed antennae, day-flying, and typically brightly colored.

cell, discal - an area of the wing delineated by the discal veins in the discal area.

costal margin - see margin, costal.

dash - a narrow, short mark extending less than half the distance along the width or length of the wing.

dentate - tooth-like markings, typically along one side of a line.

discal area - see area, discal.

discal cell - see cell, discal

discal spots - see spots, discal.

eyespot - a round multi-colored spot on the forewing or hindwing.

falcate - curved into a sickle-shape, often used to describe a wing with the tip extended into a subtle or elongate, curved point.

femur - the third segment of the true legs preceeded by the coxa and the trochanter. The femur is the first leg segment that is elongate, followed by the tibia which is also elongate.

filiform - thin and threadlike, typically used to describe long and slender antennae.

foreleg - the first pair of true legs nearest the head. The forelegs are ventrally attached to the first thoracic segment.

forewing(s) - the wing(s) attached to the second thoracic segment, the first pair of wings from the head.

head - One of the three primary body segments characteristic of insects, along with the thorax and abdomen. The head contains the antennae, mouthparts, eyes, and brain.

hindwing(s) - the wing(s) attached to the third thoracic segment, the second pair of wings from the head.

inner band - see band, inner.

inner margin - see margin, inner.

labial palps - see palps, labial.

line - a narrow mark extending more than half the distance along the width or length of the wing and associated with a particular area on the wing.

line, basal - a line in the basal area near to where the wing attaches to the thorax.

line, median - a line in the median area of the wing.

line, postmedian - a line in the postmedian area of the wing.

line, submarginal - a line in the submarginal area of the wing.

macromoth - the adult of a species of Lepidoptera with the tips of antennae tapered; in the Pacific Northwest the species occur in one of the following families: Arctiidae, Dioptidae, Drepanidae, Epiplemidae, Geometridae, Lasiocampidae, Lymantriidae, Noctuidae, Notodontidae, Saturniidae, Sphingidae, and Thyatiridae.

margin, costal - the front edge of the wing.

margin, inner - the back edge of the wing.

margin, outer - the distal edge of the wing.

median area - see area, median.

median line - see line, median

micromoth - the adult of a species of Lepidoptera with the tips of antennae tapered, typically small bodied; many families of micromoths occur in the Pacific Northwest; not a butterfly or a macromoth.

midcostal area - see area, midcostal.

ocellus spot - see eyespot.

orbicular spot - see spot, orbicular.

outer margin - see margin, outer.

palps, labial - small, segmented, filamentous appendages attached to the labium on the mouthparts.

patch - a small restricted area of the wing demarked by a distinct color but not delimited by lines.

pectinate - comb-like, often used to describe antennae with numerous fine branches arranged asymetrically along one side of antennal segments.

plumose - feather-like, often used to describe antennae with numerous fine branches arranged in opposition along the antennal segments.

postmedian area - see area, postmedian.

postmedian line - see line, postmedian.

reniform spot - see spot, reniform.

skipper - the adult of a species of Lepidoptera in the family Hesperiidae; antennae with a hooked-tip; day-flying, closely related to butterflies.

spot, orbicular - a single near round-shaped spot that occurs just short of half way along the front edge of the forewing within the discal cell.

spot, reniform - a single irregularly shaped spot, often kidney-shaped, that occurs just past half way along the front edge of the forewing at the distal end of the discal cell.

spots, discal - a combination of the reniform and orbicular spots.

stigma - a distinct marking in the median area, of variable shape, often comma or v-shaped, usually silver or white, characteristic of Plusiinae: Noctuidae.

streak - a narrow long mark extending more than half the distance along the width or length of the wing.

subanal area - see area, subanal.

subapical area - see area, subapical.

submarginal area - see area, submarginal.

submarginal line - see line, submarginal.

thorax - one of the three primary body segments characteristic of insects, along with the head and abdomen. The thorax consists of three segments with a pair of wings attached dorsally to the second and third segments, and a pair of jointed legs attached ventrally to each segment.

wingspan - the distance between the tips of the front wings in a properly spread specimen.